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Improving New Technology Reporting: Guidelines to Mobilize NASA Technical Monitors

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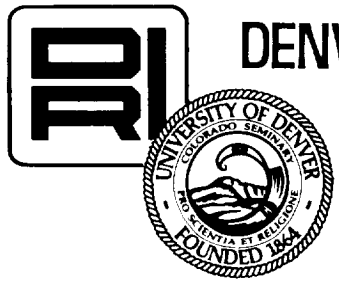

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IMPROVING NEW TECHNOLOGY REPORTING: GUIDELINES TO MOBILIZE NASA TECHNICAL MONITORS

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FOREWORD

The reporting of new technology is at the heart of NASA's Technology Utilization Program. Without such reporting there would be no NASA Tech Briefs and the dissemination of that technology broadly to American industry. The purpose of this study has been to go behind the statistics of reporting to the men and women who can make or break the system--the contract technical monitors and principal investigators who oversee most of NASA's technical programs. What are their perceptions of the New Technology Reporting system? What can be done to improve reporting?

The study team is deeply grateful to the NASA scientists and engineers who took the time to participate in this study, often with great patience in answering what seemed to be the same questions twice. We received excellent cooperation from those who participated. Special thanks are due to the Technology Utilization Officers at Ames, Goddard, Johnson, Langley, Lewis and Marshall Field Centers who contributed so much to arranging for our visits and facilitating the sample selection process. I am indebted to the fine work of my colleagues on this project: Kathryn Hirst, Research Associate, and Jody Briles, Support Specialist, who put in long hours in the arrangements and preparation of the report. My particular thanks go to Dr. James Bayton, former Chairman of the Department of Psychology and Professor Emeritus at Howard University. He was a constant source of help and encouragement from study design, questionnaire development and testing, through analysis and drafting of the report.

The report is the responsibility of the Study Director, and it does not necessarily represent either the views or policy of officials of the National Aeronautics and Space Administration which sponsored it or the Denver Research Institute.

Richard L. Chapman
Study Director

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CHAPTER 1: OVERVIEW

The Denver Research Institute's study on NASA's New Technology Reporting system (NASA's New Technology Reporting System: A Review and Future Prospects, University of Denver, May 1985), revealed that the person assigned the responsibility of technically monitoring a NASA contract is one of the key if not the key link to improving new technology reporting within NASA. As a result of these findings, DRI undertook a survey of NASA contract technical monitors at six Field Centers involving 146 NASA scientists or engineers.

The purpose is to identify what they know about both the New Technology Reporting system and technology transfer activities within NASA and more particularly at their respective Centers; to obtain their perceptions about these activities and their relative value, priority, and potential; and to identify possible points of leverage that will promote more positive participation by such individuals in New Technology Reporting. The survey covered not only individuals who currently are doing technical monitoring (rarely as a fulltime or primary responsibility), but also includes principal investigators who have or have had technical monitoring responsibilities, and a small group of individuals who are particularly active in technology transfer activities at these Centers.

The interviews focused upon New Technology Reporting as a part of the technology transfer activities. Therefore, the respondents were introduced to the topic through discussion of their knowledge about and interest in technology transfer activities in a broad sense. This was followed by specific attention to the New Technology Reporting system, their perceptions of it, and what they did in relation to this function. The study results will be discussed in four general areas: (1) the respondents' awareness of both technology transfer and New Technology Reporting, (2) their perception of the value of these activities, (3) the reward system associated with these activities, and (4) barriers to more extensive participation in both technology transfer and New Technology Reporting.

Awareness of Technology Transfer and New Technology Reporting

Most of those interviewed have at least some knowledge about NASA technology transfer activities--either at the agency or Field Center level. The majority can cite personal experience or personal knowledge regarding one or more activities in technology transfer. In addition, most NASA scientists and engineers interviewed firmly believed that the function of technology transfer is one among numerous responsibilities attached to his or her particular job.

There is wide variation in perception of what constitutes "technology transfer" and how that function is or should be carried out by individual NASA employees. For example, it was not unusual for individuals not associated with a flight project to view technology transfer principally as the publishing of test or research results. Since the baseline definition used here was limited to "spinoff" transfer, such tendency may have resulted in over-reporting participation in technology transfer.

In some instances, the remark was made that technology transfer is not a direct responsibility of a scientist or engineer's job at NASA because "there is a Technology Utilization Office that is responsible for that function."

The widespread awareness about technology transfer activities and the function was not reflected in the respondents' awareness of New Technology Reporting. Only a minority of respondents are even aware that there is a "system" for the reporting of new technology—both in-house and among contractors. Few technical monitors have seen any information regarding New Technology Reporting, apart from that which appears in the contract, or, more likely, the periodic "tickler" notices reminding technical monitors of the requirement to report new technology each year or at contract closeout. In spite of this, there appears to be stronger participation, even if at a low rate, than one would anticipate from the level of awareness.

Knowledge about the New Technology Reporting system falls off rapidly as one discusses specific details. In the course of the interview, respondents were presented with a simple graphic depiction of the system. Virtually no one was familiar with all of the elements, and a surprising number were pleased to learn, apparently for the first time, that cash awards are made for successful publication of new technology items in NASA Tech Briefs.

Perception of Value

In spite of the relatively meager resources devoted to the Technology Utilization Program, it is almost universally perceived as being successful and of value to NASA. When probing what utilities technology transfer has for NASA as an agency, and what damage or hurt would be done to the agency if the program were not successful, invariably the respondents answered that it is important in presenting the NASA program to the public, showing its value, and thereby obtaining public support for NASA programs. Most also saw this public support as being a key element in continued congressional support, and thereby supporting budget requests. A significant minority of respondents also included, as an important value to NASA, the technical communication and feedback—in terms of technological value—that the technology transfer activities tend to promote. Most often this was viewed as "avoiding duplication of effort," although several respondents also cited the value of the "give and take" associated with technology transfer.

The New Technology Reporting system was viewed almost exclusively as being useful to American industry and others who receive the benefits of knowing about and using NASA technology. It was rare that anyone cited a value received by NASA other than the extent to which successful new technology reporting provided fuel for public support of NASA programs. A few respondents cited the value of expanding technological communications, and the wider sharing of information (including feedback) that New Technology Reporting facilitates.

The fact that a high proportion of respondents spontaneously acknowledge that NASA's technology transfer (75 percent) or New Technology Reporting (63 percent) efforts are valuable because they contribute to the agency's public image is noteworthy. It suggests that there is widespread appreciation that these activities help sustain the kind of support essential to continue its scientific and technical objectives.

The Reward System

Information solicited about the reward system, though not detached from technology transfer in general, was more specifically targeted at those elements of the reward system which are used in conjunction with the New Technology Reporting system. This included NASA Tech Briefs awards, patent awards, recognition of technological achievement, etc. Although there is widespread awareness of some of these various awards, and often personal familiarity with specific awards and individuals known to have received such awards, there appears to be little association of the reward system with New Technology Reporting activities.

Among those who actually received awards or who have been closely associated with individuals who have participated in the reward system, several suggestions were made on how the reward system might be used more positively. Most indicated that there is too much time lag between submission of an item and the actual award itself. Another point is the insufficiency of the award. At the time the survey was initiated the NASA Tech Briefs award was $100, though subsequently raised to $150. Another "minor" irritation is the practice of withholding Federal taxes prior to conferring the awards so that the $100 award turns out to be a check for $80.

Most of those familiar with the award system agreed that the primary value of the system is recognition and not the cash involved per se. This finding is important to improving the incentives to participate. As noted below, the most effective incentives involve personal, professional satisfaction or recognition by management rather than monetary reward.

Barriers To Participation

Generally, barriers to participation in either technology transfer or the New Technology Reporting system are similar. The principal exception is the need for greater awareness. This tends to be linked with the New Technology Reporting system. The study team was impressed by the apparent commitment of technical monitors to doing whatever is required of them to report new technology. However, most have little knowledge about the system, how it might work, its value, and how it fits into NASA's other responsibilities. Most expressed the opinion that had they known more about it, they would have been more active in participating and in searching out new technology.

Perhaps the next most important element is the priority placed on New Technology Reporting both by NASA as an agency and within the respective Field Centers. The very fact that so few people know much of anything about the system reflects an almost total absence of priority. However, once there is awareness, technical monitors (without exception) acknowledge that the more emphasis given to this function by their supervisors, the more attention they will give to the function. This was true of technology transfer activities in general, but is most pronounced with respect to New Technology Reporting because of its poor level of awareness.

A closely related factor is the attitude and ignorance of middle management. The interviewers were given specific examples where--even in the presence of senior management interest in technology transfer--middle management discouraged, resisted, or actually prevented participation by subordinates.

This does not seem to carry over as extensively into the New Technology Reporting system.

A third barrier is the lack of feedback when individuals do participate. This most often is attached to those circumstances in which a report had been prepared to enter the NASA Tech Briefs system and is eligible for award. Examples were given of material being prepared and then "disappearing" into the system with virtually little or no information coming back to the originator or the technical monitor. Again, the failure of this "system" often was laid to the general lack of awareness in the Center about the New Technology Reporting system, its purpose, and its values.

Obviously, there are differences in degree from one Center to another. For example, the question of priority is a good deal more pronounced in the NASA Flight Centers than is the case in a NASA Research Center.

One can be pleased with the level of awareness and recognition of the value of technology transfer activities. On the other hand, it is a wonder that the New Technology Reporting system is working as well as it has, given the poor level of knowledge about it among the individuals upon which the system most depends.

A review of the answers to all questions by the respondent groups (technical monitors, principal investigators, and the active group) reveals differences among these groups which validate the sampling process and confirm the inclusion of those who do or should participate in the reporting of new technology. A first comparison was between technical monitors and principal investigators. (See Table 73, Appendix A-41/42.) It showed that technical monitors, compared to principal investigators, were more likely to see contract technical monitoring as part of their jobs. Principal investigators were more familiar with and tended to be more involved in technology transfer activities, while technical monitors knew more details about the New Technology Reporting system and were more involved in that system, albeit in a more formal contractual requirement sense. Principal investigators participate in the technology transfer activities more frequently for personal and professional reasons, while technical monitors tend to participate for reasons related to requirements of the organization or the job.

When the active group was compared to the combination of technical monitors and principal investigators, their more active participation and greater depth of knowledge was confirmed. (See Table 74, Appendix A-43/44.) The actives were more likely to see technology transfer as a part of their job responsibilities. They relied more on the Technology Utilization Program and firsthand experience sources of knowledge about technology transfer, and were more active in both New Technology Reporting and general technology transfer activities. They tended to be more critical of both NASA's management attention and emphasis upon both technology transfer and New Technology Reporting activities. Finally, the active group tended to be motivated to participate more by non-monetary incentives.

As a whole, the three groups were consistent with what one might generally anticipate their perspectives to be, given consideration to variations among the Field Centers.

Suggestions for Action

There are two main areas in which action needs to be taken to preserve, then expand the reporting of new technology. These are the development and activation of an education and orientation program directed both at NASA employees and to their contractors; and the development and reinforcement of management support for this activity, beginning with senior leadership in NASA Headquarters and extending to the work units in the Field Centers. It is believed that the necessary steps in these two areas are feasible, even in the face of some challenges within the current organizational climate. The action steps require due consideration of the disruption caused throughout the agency resulting from the general trauma of the Shuttle accident. Important differences among the Field Centers relating to their respective missions and management styles also must be incorporated in variations of the suggested action steps. Finally, the relatively weak position from which the Technology Utilization Office in the Field Centers must operate will continue to hinder their full support of improvements in the reporting of new technology unless they receive more management attention and support.

The survey demonstrates the need for a systematic education and orientation program to make both NASA and its contractor employees aware of and more sensitive to the need for systematic reporting of new technology. This can be accomplished without a great deal of cost or the undue expenditure of time. NASA needs to develop some simple materials that can be made widely available (such as attractive brochures, guidelines, reporting formats, and even a brief videotape). These should concentrate upon a simple description of the New Technology Reporting system, its purposes, its value to NASA and the Nation, and the responsibilities of the various actors within the system. The Technology Utilization Offices in the Field Centers can provide a point of liaison for the distribution of this material both in-house and at the contractors, to assure that technical monitor and principal investigator provide appropriate orientation to their respective clientele. Orientation then needs to be given to supervisors at various levels of management to assure their awareness and understanding of responsibilities.

Management support needs to be established at all levels within the organization. This requires visible, overt support for the system and appropriate follow through. As a number of respondents have suggested, it may prove useful to include the New Technology Reporting function as an element in the job description of technical monitors and supervisors alike. As this system is tightened up, requiring follow up in a more systematic fashion on the part of all concerned, management necessarily will have to provide additional manpower and/or resources to its Technology Utilization Offices. Too often these offices are unable to provide either the guidance or the necessary follow up because of this deficiency.

In summary, NASA easily has capability to restore and to improve its system for the reporting of new technology. It is important that it do so or face the loss of the very system which supports much of its technology transfer activities, particularly the effort to make technology more widely available through its NASA Tech Briefs. The human resources in terms of the technical monitors and principal investigators are in place and generally willing to make the effort required to support the success of this system. What is needed is the more visible and continued use and support of NASA management--at all levels--coupled with a relatively simple but systematic

education and orientation effort to help both NASA employees and its contractors understand the need, value, and operation of the New Technology Reporting system.

CHAPTER 2: STUDY METHODOLOGY

In reviewing both the strategy used in organizing the study and the detailed methodology which was applied, it is important to keep in mind the principal reason for the study. The primary purpose was to probe what might be done to tap the interest and energy of NASA contract technical monitors to become more actively involved in seeking and reporting new technology. A secondary but important purpose was to seek the interest and involvement of these same persons in technology transfer activities more generally, to encourage their more active participation.

The data for this analysis were collected from six NASA Field Centers: Ames Research Center, Goddard Space Flight Center, Johnson Space Center, Langley Research Center, Lewis Research Center, and Marshall Space Flight Center. Interviews were conducted with respondents over the course of one week at each Field Center. A different Field Center was visited each month during the period October 1985 through March 1986 in order to provide sufficient time for the necessary administrative arrangements in final sample selection and arrange for the individual interviews.

Strategy for the Study

The first task was to define the populations from which the samples were selected in order to be as inclusive as possible of those individuals in NASA who have a working level responsibility for the reporting of new technology. Clearly, the primary group was the NASA contract technical monitors who are vested with this responsibility by NASA procurement regulations.

In order to assure the fullest inclusion possible, a second population was defined that, it was hoped, would cover the reporting of new technology resulting from NASA in-house activity or from work done under contract or grant in support of such activity. This second population consisted of principal investigators, or those individuals within NASA who had responsibility for a specifically delineated technical activity of a laboratory or similar in-house component.

Finally, we established a "control" group, for comparison purposes, consisting of individuals at each Field Center who were considered to be especially active in technology transfer activities as defined by the Technology Utilization Officer at each Field Center.

The authors believe that the survey data demonstrate that the samples from these populations were "true" to the purposes of the study, as revealed in the responses to questions 1-6 (see Appendix A).

Nature and Order of Questions

From experience gained in the review of NASA's New Technology Reporting system completed in 1985[1], it was evident that the relatively poor awareness

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[1] NASA's New Technology Reporting System: A Review and Future Prospects, Denver Research Institute, University of Denver, May 1985.

regarding details of NASA's technology reporting system would make it difficult to obtain meaningful data from many NASA scientists and engineers. In order to obtain the best and most accurate information possible, it was necessary that the interview gradually introduce the topic of New Technology Reporting from related topics with which the prospective respondents were likely to be more familiar. It is for this reason that the first portion of the questionnaire deals principally with the respondents' knowledge about and participation in technology transfer activities. It was hypothesized that most NASA employees would have at least some knowledge about technology transfer activities stemming from such sources as Spinoff, agency or Field Center newsletters, word of mouth or personal experience, and the general press. This proved to be true.

A second strategy in developing the interview plan and questionnaire was to move from the general to the more specific, discussing broad elements of the topic, providing more information with each step, and finally discussing specific elements of technology transfer, then of New Technology Reporting. The very last question asked for the respondents' viewpoints on what might be done to improve participation in the reporting of new technology.

As a precaution against influencing the respondents' answers to early questions regarding their knowledge or awareness about either technology transfer or New Technology Reporting, little information was given to the prospective respondents prior to the interview. In spite of this lack of specificity about the purpose of the interview, the survey team had an outstanding response from those selected in the sample in terms of participation and full cooperation throughout the course of the interviews.

Finally, 46 of the 70 questions were "open ended," requiring the respondent to give an explanation in his or her own words. This gave them wide latitude in determining the answers and further diminished interviewer influence on the responses.

Three Dimensions: Saliency, Knowledge, and Motivation

Saliency (spontaneous mention) reveals the relevance, significance, or prominence that a given function, such as technology transfer or reporting of new technology, has for the respondent. The degree of saliency of a particular function demonstrates how much that function readily "comes to mind."

A second dimension pursued in the survey was knowledge about or specific awareness of (in some detail) the two functions of technology transfer and reporting of new technology. Questions here sought to reveal both the extent of the respondent's knowledge about these two functions, and the various sources of information about them.

Third is the dimension of motivation. Here the authors searched for the degree of participation in the functions of technology transfer or the reporting of new technology, and the reasons for that participation or nonparticipation.

These three dimensions are not mutually exclusive, so that a particular question might reasonably relate to more than one of them. However, collectively the questionnaire was designed to cover these dimensions in sufficient

depth and detail to provide multiple sources and perspectives regarding them for each respondent. In the aggregate, they provide a comprehensive picture of each respondent's perception, knowledge, participation, and reasons for level of participation in both technology transfer and reporting of new technology.

Sample Selection

The study was conducted at six NASA Field Centers: Ames, Goddard, Johnson, Langley, Lewis, and Marshall. All are involved in both in-house and contract R&D. Two centers were considered too anomalous from this pattern and were excluded: the Jet Propulsion Laboratory because, as the only contractor run center, all of its work is done under contract or subcontract; Kennedy Space Center because its mission as an operational base and launch site doesn't accommodate much of an R&D function.

At each of the study Field Centers, a sample was selected from a population of scientists and engineers. The sample included three groups of respondents: technical monitors (TM) responsible for R&D contracts, principal investigators (PI) responsible for in-house R&D projects, and a "control" group with a solid track record of involvement in technology transfer activities, termed the active group (AG).

The technical monitors were selected randomly from a list of contract technical monitors on "active" R&D contracts. Due to delays in closeout procedures, some on the list were not currently monitoring a contract but had been in the recent past; they remained in the study since recall was not considered a problem. Inclusion was based on availability for interview.

A list of principal investigators was obtained from each Center's latest annual Research and Technology Operating Plan (RTOP) summaries, which were then screened by the Technology Utilization Officers to retain those with research responsibilities and drop those with only managerial duties. A sample was selected randomly from the remaining list, and inclusion was based on availability for interview.

Members of the active group were handpicked by the Field Center Technology Utilization Officers for their knowledge of and experience with technology transfer activities.

The goal was to conduct at least 20 interviews at each of the six Field Centers. The distribution of those actually interviewed was:

	Ames (23)	Goddard (20)	Johnson (21)	Langley (31)	Lewis (26)	Marshall (25)	TOTAL (146)
TM	48% (11)	25% (5)	52% (11)	36% (11)	66% (17)	68% (17)	49% (72)
PI	30% (7)	40% (8)	24% (5)	45% (14)	15% (4)	16% (4)	29% (42)
AG	22% (5)	35% (7)	24% (5)	19% (6)	19% (5)	16% (4)	22% (32)

The technical monitors made up the largest proportion of the sample (49 percent, n=72) to assure the inclusion of those who, according to the procedures of the New Technology Reporting system, presumably worked with the system. The selection process assumed that scientists and engineers with principal investigator responsibilities for in-house R&D made up a sizable component (29 percent, n=42) because they are also in a position to develop perceptions on reporting and transferring new technology, but from another perspective. A smaller number (22 percent, n=32) of scientists and engineers with a history of active participation in technology transfer activities was included for purposes of comparison, to see what differentiated them from the other two groups, and whether those differences pointed to needed alterations.

There is an acknowledged overlap of functions among the three groups, e.g., 67 percent of the principal investigators and 72 percent of the active group indicated they also had contract technical monitoring responsibilities. But specific responses to some of the questions indicate that all three points of view were expressed:

	TM	PI	AG
Q1. mentioned contract technical monitoring as one of expected tasks	44%	14%	13%
Q24. involved in technology applications projects	21%	19%	63%
Q42. involved in only in-house work	1%	15%	3%

The degree to which the technical monitor group is represented is evident in question 1: 44 percent of those designated in the technical monitor group recognized without prompting that contract technical monitoring was among the tasks they were expected to perform--far above the 14 percent of the principal investigators and 13 percent of the active group. Question 24 asked about involvement in technology applications projects, which emanate from the Technology Utilization Office. As expected, members of the active group have been the most involved. To confirm the inclusion of the principal investigator perspective, question 42 shows that a higher proportion of those in the principal investigator group stated that they were involved only in in-house work (and could not compare New Technology Reporting roles inhouse to contractor).

Questionnaire Development

A questionnaire (see Appendix B) was developed to serve as the data collecting and recording instrument. Data were collected at the Field Centers in face-to-face interviews that took anywhere from 20 minutes to over 2 hours. Four "cards" or visual aids (see Appendix B) were developed: a definition of technology transfer; a policy statement of the New Technology Reporting system from NASA Federal Acquisition Regulations; a flow chart of the steps in the New Technology Reporting system; and a list of awards given for New Technology Reporting participation. These cards were handed to the respondent at appropriate times in the interview.

The study instrument was pretested in pilot studies conducted at Goddard and Langley Field Centers.

Conduct of the Interviews

Participants, including the active group, received a letter from the study director stating that they had been selected randomly from the pool of scientists or engineers with research or technical management responsibilities. They were asked to to take part in a survey, sponsored by NASA, of NASA researchers and technical managers to obtain their perspectives on a number of technical management topics. At the outset of the interview, respondents again were informed that the study was being conducted for NASA to determine how NASA scientists and engineers perceived various aspects of their jobs. The purpose was deliberately left vague so as to avoid biasing the "cold" response to the first question. Some respondents nevertheless demanded--and got--a more thorough explanation of what the study hoped to accomplish. It caused no discernible difference in response to question 1.

Before proceeding with the interview, respondents were also assured of confidentiality and anonymity.

Analysis

At the conclusion of data collection, responses for the open ended questions were categorized and coded. The data were entered into the computer and crosstabulations were produced, usually of respondent category against coded responses. These tables form the basis of the conclusions reached and presented in this report. The complete list of tables appears in Appendix A.

CHAPTER 3: NEW TECHNOLOGY REPORTING

In this survey, questions 1-6 and 33-70 related to New Technology Reporting (see Appendix B). The first six questions were directed toward reviewing the respondents' perspectives of the contract technical monitoring function within which the reporting of new technology is a subelement. The remainder of the questions 33-70 were directed specifically to the function of reporting new technology. This series of questions, particularly the first six, demonstrate that the survey did encompass the proper population for its purpose. That is, this group of technical monitors, principal investigators and those active in technology transfer did have responsibilities in contract technical monitoring which made the reporting of new technology salient to them, although in varying degrees. The later questions (33-70) also reveal the various strengths and weaknesses in the current system of New Technology Reporting, as well as potential points of leverage for substantial improvement in the future.

Saliency

The very first question asked in the interview was, "Tell me the various tasks you are expected to do in your job." The purpose of this question was to determine the extent to which respondents spontaneously associated contract technical monitoring (and technology transfer) as being part of their jobs. Among the technical monitor sample, 44 percent spontaneously mentioned contract technical monitoring. The same was true for 14 percent of the principal investigator sample and 12 percent of the active group. Other replies typical of the responses made were:

- lead engineer on a flight project;
- evaluate hardware that is developed, making suggestions for improvement;
- oversee development of hardware for spacecraft systems;
- conduct a research program;
- oversee out-of-house contract; and
- attend to hiring, evaluation of people who work for me.

If the technical monitoring of contracts was not mentioned in responses to question 1, the respondents were asked explicitly if this was one of their tasks (question 2). In this set of responses, 85 percent of the technical monitors sampled acknowledged contract monitoring as a part of their job as did 61 percent of the principal investigator sample and 68 percent of the active group sample. Further, when those who responded "no" to question 2 were asked why contract technical monitoring was not a part of their job (question 3), from one-half to two-thirds indicated that this function was delegated by them to a subordinate.

All of the respondents were next asked, "Of these various tasks that you are expected to do in your job, what do you consider the primary ones?" (question 4). Nearly half (47 percent) of the technical monitor sample spontaneously mentioned contract technical monitoring as did 24 percent of the principal investigator sample and 28 percent of the active group sample. In the followup question as to why contract technical monitoring is a primary task (question 5) the largest group of answers clustered on this function

being important on a continuing basis (ranging from 40 percent of the principal investigators responding to 67 percent of the active group responding). Among those who did not spontaneously mention contract technical monitoring as a primary task, the vast majority acknowledged it as being a part of the job (question 6), but being a minor part in their judgment (from a low of 68 percent among the technical monitor sample to 82 percent of the active group sample).

In conclusion, this set of data suggests that: (1) contract technical monitoring is prevelant among the respondent population as a job responsibility; (2) nearly all are involved directly or in a supervisory capacity in this function; and (3) a substantial minority of all the respondents rate contract technical monitoring as a "primary task." However, the saliency of the general function of contract technical monitoring, as measured by initial spontaneous mention, seems to be somewhat limited--even among technical monitors.

Knowledge--Personal Involvement

Eight components of the respondents' knowledge of and personal involvement in the New Technology Reporting system were examined in this survey: (1) awareness of the system, (2) adequacy of information about the system, (3) understanding of the system, (4) perceived role in the system, (5) the kinds of people with whom to interact in the system, (6) the extent to which the respondent encouraged reporting, (7) knowledge of the awards system and award participants, and (8) the best or worst elements (along with reasons) in the New Technology Reporting system. Note that, in line with the general study strategy, topics of discussion move from the more general to the more specific, permitting the respondent to reply in the fullest possible terms (based on previous answers) yet without specific prompting from the interviewer.

Awareness

The first question in this series (question 33) gave the respondent the opportunity to examine a statement about the objectives of the New Technology Reporting system and to indicate his or her awareness of the system. Each respondent was presented with a card (Card 2, Appendix B-12) that depicted the most recent statement regarding the objective of the New Technology Reporting system (NTRS). They were asked, "Has this or a similar statement ever been brought to your attention?" Among the technical monitors, 72 percent replied that they were aware of this policy. Among principal investigators the percent was 79, and among the active group 69 percent.

In probing how they became aware of the system, most said it was through the "boilerplate" in NASA grants or contracts. The requirement for New Technology Reporting is located among numerous other administrative requirements of the standard clauses in each contract or grant instrument. This answer was spontaneously given by 52 percent of the technical monitors and 36 percent each of the principal investigators and active group. Other sources mentioned were the Technology Utilization Office at the Field Center, the patent process, and other information provided by NASA in-house sources (see Table 37, Appendix A-19).

When prompted (question 35), fully one-third or more of the respondents offered additional sources of information about the New Technology Reporting

system beyond the source that they named in answer to the question of how they became aware. These sources were scattered widely (see Table 39, Appendix A-20) but among the leaders was the Field Center Technology Utilization Office.

Adequacy of Information

When asked how adequate was the information reaching them about NTRS (question 37), three-quarters or more of the respondents replied that it was somewhat or quite adequate. However, when looking at only the "quite" and "not at all" answers it is evident that a substantial minority of all three classes of respondents attest to an inadequacy of information about NTRS.

ADEQUACY OF INFORMATION ON THE NEW TECHNOLOGY REPORTING SYSTEM
(Derived from Table 40, Appendix A-21)

	TM	PI	AG
Quite	24%	32%	38%
Not at all	25%	20%	25%

When given the opportunity to explain their answers with respect to the adequacy of information about NTRS (question 38), the most often expressed (again spontaneously) reason cited the lack of information, knowledge, and awareness. Technical monitors lead the pack with 44 percent.

REASONS FOR ADEQUACY/INADEQUACY OF INFORMATION ON NTRS
(Derived from Table 41, Appendix A)

	TM	PI	AG
Lack of knowledge/awareness	44%	36%	38%
Knows enough	32%	33%	34%
Other agency efforts to inform	15%	26%	25%

A cross-tabulation was done to match the relative degree of adequacy with reasons given. Those responding "quite adequate" gave the following reasons: know enough about the system already, other agency efforts to inform are adequate, kept aware of the system by the Technology Utilization Officer. Among those who rated the adequacy of information as "not at all," the overwhelming reason given was the "lack of knowledge or awareness" (see Table 42, Appendix A-11). The type of comment given regarding the inadequacy of information included: I want to know more, it is not discussed much, it is not discussed or stressed at meetings, I have to search for information, and annual publications are not enough.

Understanding of the System

At this point Card 3 (see Appendix B-13) was presented to each respondent as being "a representation of the New Technology Reporting system from initiation through publication in Tech Briefs to awards." They were given time to review this briefly and then asked, "Does this agree with your understanding of the system?" (question 39). Among the technical monitors 93 percent indicated agreement, as did 91 percent of the active group and 76 percent of the principal investigators. This may be somewhat misleading. Of those who said that their understanding of the system was different, some indicated that they had no understanding of how the system worked, did not receive feedback, published only in scientific or engineering journals, were familiar with only one part of the system, or otherwise made replies which revealed a substantial lack of knowledge about the system. As subsequent, more detailed questions were asked, it became evident that the respondents were not as fully aware of the elements or workings of the NTRS as the high percent of positive answers to this question might lead one to believe.

Perceived Role in NTRS

The next question (question 41) deals with the heart of the survey, as the respondents were asked, "What do you see as being your role in the New Technology Reporting system?" Without any prompting or reminder that NASA policy clearly puts the responsibility on the shoulders of technical monitors (in the case of contracts or grants) and supervisors (in the case of in-house activity), the respondents offered a wide variety of answers ranging from "none" to "fill out forms and paperwork." The three replies most often given are shown below.

WHAT IS YOUR ROLE IN NTRS?
(Derived from Table 44, Appendix A-23)

	TM	PI	AG
Invent/innovate, report, submit	40%	43%	41%
Monitor contracts	46%	29%	25%
Encourage, maintain awareness	11%	19%	41%

Note that all the groups tend to place relatively high importance on a role which could be read to mean that the respondent is the innovator or inventor ("invent, innovate, report, submit"). The active group, probably the most knowledgeable about technology transfer activities, places a high value on the role of "encourage, maintain awareness," which is a positive action role in relationship to the reporting of new technology. That is, in this role the respondent must take the initiative to stimulate other individuals while being aware of the system in general and how to get the job done. It should be noted that the technical monitors rated last in giving this reason, while rating highly activities that represent the status quo, e.g., "monitor contracts."

Continuing the discussion of the respondents' roles in NTRS, they were asked whether or not that role was different depending upon whether they were dealing with in-house innovators or those working under contract (question 42). Among those answering "yes" the highest was the active group (53 percent) followed by the technical monitors (40 percent) and the principal investigators (28 percent). When probed about the reasons for answering yes, the major difference cited, particularly by the technical monitors and the active group was that one had first hand access to those individuals involved in-house, while the innovator/inventor among contractors was more removed and therefore more difficult to ferret out. (See Tables 45 and 46, Appendix A-23/24.) Among other reasons given for the difference (and difficulty) were the problems of proprietary data, the judgment that contractors were doing less innovative work because they had to "build to narrow specifications," and the positive observation that contractor reporting is more systematized due to the administrative contract requirements and, therefore, follows a form and pattern which is easier to monitor.

Kinds of People With Whom One Interacts in NTRS

At this point respondents were asked to "Tell me whether you get involved in the New Technology Reporting system with each of the people I am going to mention" (question 45), and then the following four categories were listed: (1) innovator/inventor, (2) contractor's new technology representative, (3) Field Center's New Technology Reporting officer, and (4) New Technology Reporting evaluator (Table 48, Appendix A-25). As might be anticipated, the highest degree of involvement occurred among the active group ranging from 97 percent with the innovator/inventor to 81 percent for the Field Center's New Technology Reporting officer to 39 percent for both contractor's new technology representative and the New Technology Reporting evaluators. Both technical monitors and principal investigators also had their highest contact with the inventor/innovator (82 percent and 71 percent, respectively) and with the Field Center's New Technology Reporting officer (53 percent and 49 percent, respectively). Although the relative proportions of involvement among the four classes of persons probably is reasonable, the high degree of contact with the innovator/inventor must be taken with some caution because the actual conduct of the interviews revealed that frequently the respondent was the innovator/inventor referred to. This is particularly true of both the active group and the principal investigators.

Encouragement or Promotion of Reporting

Questions 46 and 48-51 were directed at the extent to which the respondents encouraged the reporting of new technology by contractors or subordinates, and the extent to which that encouragement produced results (see Appendix B and Tables 48-52, Appendix A-25/26). The active group was most aggressive in encouraging or promoting reporting of new technology, with 88 percent replying that they had personally been involved in such encouragement. The positive responses for technology monitors was 71 percent and that for principal investigators 52 percent. With respect to recommending an innovation or invention be considered for publication in NASA Tech Briefs, 72 percent of the actives, 43 percent of the technical monitors, and 40 percent of the principal investigators said they had personally done this.

Knowledge of Awards and Award Winners

Card 4, New Technology Reporting System Awards to Innovators/Inventors, was presented to the respondents for their review. They were then asked, "With which [of the following awards], if any, are you familiar?" (question 57). They were also asked whether or not they personally knew any winners (question 58). The highest degree of familiarity with both awards and recipients was among the active group followed by the principal investigators. Over all, the greatest familiarity was with the NASA patent awards, followed closely by awards for publication in NASA Tech Briefs. A close third was the NASA scientific/technical contribution award. Very few (no more than 19 percent in the case of the active group) were familiar with company sponsored awards or others. (See Table 60, Appendix A-31.)

There was a noticeable decline in personal familiarity with particular winners of the awards. For example, 81 percent of the technical monitors indicated that they were familiar with the NASA Tech Briefs awards, while 54 percent noted that they personally knew a winner of such an award. Corresponding percents were 81 percent and 62 percent for principal investigators, 97 percent and 94 percent for the active group. Generally, technical monitors and principal investigators were more familiar with both the awards and awardees related to NASA patents than they were of NASA Tech Briefs awards, while the opposite was true of the active group. (See Tables 60 and 61, Appendix A-31.)

Best and Poorest Elements of the New Technology Reporting System

In the final series of questions relating to NTRS (questions 64-67), respondents were referred back to Card 3 on the New Technology Reporting system and asked, "What element or portion of the New Technology Reporting system works best?" (question 64), and then "Why?" (question 65). This was followed by, "What element of the New Technology Reporting system most needs strengthening?" (question 66) and "Why?" (question 67). This series of questions tended to confirm the relatively weak knowledge of the respondents about the New Technology Reporting system. Fully 59 percent of all respondents could not or did not answer the question on which element works best. Although the respondents had the card depicting the system, the answers were unstructured, that is, the respondent could give an answer in his or her own words. The largest response category, consisting of ten respondents, replied that the system as a whole works fine. Another six replied that "nothing comes to mind." (See Table 67, Appendix A-36.)

When asked, "What element or portion of the New Technology Reporting system most needs strengthening?", there was a similarly large number not answering (46 percent of all respondents). The largest cluster of answers centered on the reply "nothing" (42 percent of principal investigators, 18 percent of the technical monitors, and 14 percent of the active group). Among the other answers, those most selected were "contractor procedures and participants" (selected by a high of 24 percent of the active group responding) and "New Technology Reporting evaluator" (active group was high with 19 percent). (See Table 68, Appendix A-37.) The wide scatter of respondent replies over 17 different answers suggests not only a lack of consensus, but a relative lack of knowledge or understanding of the system--especially when combined with the high rate of no response.

Motivation

Seven topics of interest related to motivation were explored in the interviews: (1) relative emphasis upon New Technology Reporting, (2) pressure by NASA to promote New Technology Reporting, (3) ways by which NASA either benefits or suffers from its relative success in New Technology Reporting, (4) disincentives in the award system, (5) respondents' ratings of the New Technology Reporting system, (6) taking a more active role in the New Technology Reporting system, and (7) ways to motivate marginal participants.

Emphasis on New Technology Reporting

There was some consensus among the respondents on the emphasis NASA gives to the New Technology Reporting system (question 52). Among technical monitors 40 percent rated NASA as giving a great deal of emphasis, principal investigators 35 percent and the active group 38 percent. On the other hand, 28 percent of the active group characterized NASA as giving little or no emphasis to New Technology Reporting. This tapered off through principal investigators to technical monitors.

EMPHASIS GIVEN BY NASA TO NEW TECHNOLOGY REPORTING
(Derived from Table 53, Appendix A-26)

	TM	PI	AG
Great deal	40%	35%	38%
Little or no	17%	22%	28%

When asked why they gave the emphasis rating they did (question 53) the largest number responded positively--that they were aware of the system and the organized effort it represents--ranging from 42 percent for technical monitors down to 33 percent for principal investigators. The second most mentioned reason was a negative one to the effect that the system is not visible and the effort was not apparent; the percent responding ranged from a high of 26 percent for technical monitors to 21 percent for principal investigators (see Table 54, Appendix A-27). When the rating and the reasons given for the rating were cross-tabulated, it revealed that those answering a "great deal" of emphasis gave as their reasons: awareness, evidence of organized effort, management recognition of importance, and the goals fit in with the job. Among those who judged that NASA gives little or no support to New Technology Reporting, the basic reason was that the system is not visible and there is little awareness of it. (See Table 55, Appendix A-28.)

The next set of questions focused on the respondents' perceptions of their respective work unit's emphasis on New Technology Reporting (question 54), and the reasons therefore (question 55). Here, the level of perceived emphasis declined markedly. Among those who judged their respective work unit to give a great deal of emphasis, the percent ranged from a high of 28 percent among the active group to a low of 17 percent among the principal investigators. Those judging the work unit to give little or no emphasis ranged from a low of 29 percent for technical monitors to a high of 40 percent among principal investigators.

WORK UNIT EMPHASIS ON NEW TECHNOLOGY REPORTING
(Derived from Table 56, Appendix A-28)

	TM	PI	AG
Great deal	19%	17%	28%
Little or no	29%	40%	38%

Clearly, the respondents see the work units as giving considerably less emphasis to the New Technology Reporting system than does NASA management as a whole. The major reason given for a low rating on emphasis is "unaware of the system, not visible." (See Table 57, Appendix A-29.) The cross-tabulation revealed that those rating the work unit as giving a great deal of emphasis stated as their reasons that their contributions were solicited for reporting new technology, and that they perceived an awareness and use of the system. Among those judging the work unit to have little or no emphasis upon New Technology Reporting, the principal reason given was a lack of awareness of the system, a lack of visibility, followed by the perception that contribution to New Technology Reporting was not solicited by management. (See Table 58, Appendix A-30.)

The perception of the degree of emphasis can indicate the amount of motivating stimulus that the respective levels of the organization--agency and work unit--are using to support the system. There is a decided dropoff from the NASA level to the work unit level; only 43 percent of those saying the agency gives a great deal of emphasis to New Technology Reporting carried this judgment over to the work unit. On the other hand, of those who judged the agency to give little or no emphasis to New Technology Reporting, 90 percent also felt that their work unit provided little or no emphasis to the function.

AGENCY EMPHASIS COMPARED TO WORK UNIT EMPHASIS
ON NEW TECHNOLOGY REPORTING

	Agency		
Work Unit	Great deal	Some	Little or no
Great deal	43%	9%	--
Some	47%	65%	10%
Little or no	9%	26%	90%

NASA Pressure to Promote New Technology Reporting

When asked, "How much pressure does NASA use to promote the New Technology Reporting system?" (question 56), only one respondent of 139 who answered the question said "too much" (see Table 59, Appendix A-31). Although the majority answered "just about right," a substantial minority judged that NASA put too little pressure on its scientists and engineers to promote New Tech-

nology Reporting. The proportions range from a high of 36 percent among the active group, to 22 percent for the technical monitors, to a low of 16 percent of the principal investigators.

How NASA Benefits or Suffers From New Technology Reporting Performance

The respondents were queried about general benefits that NASA derives from a successful reporting system. Again, the answers were open ended and unprompted. They were asked, "In NASA as a whole, how does the agency benefit from the New Technology Reporting system?" (question 62). The most frequently stated benefit was the resulting positive public and political image (61 percent of technical monitors, 60 percent of principal investigators, and 72 percent of the active group). (See Table 64, Appendix A-35.) This reply was more popular than any other by a ratio of 3:1. The next closest three were: it provides a systematic way of realizing NASA goals, it provides support and better working NASA projects, and it allows mutually beneficial interchange along a two-way street.

Taking the other side of the coin, respondents were asked, "How does NASA suffer if its New Technology Reporting system is not effective?" (question 63). As might be anticipated, the answers were the opposites of those in the above question. A "lessened or negative public and political image" was cited by 60 percent of technical monitors, 60 percent of the principal investigators, and 78 percent of the active group. Following considerably behind these were that NASA underperforms and the lack of outside input (see Table 66, Appendix A-35).

The results of this pair of questions highlight the appreciation of all respondents for the value of these activities for NASA's public relations. Respondents viewed the impact as one of contributing to stronger support--among the general public, industry, and the political structure--for all NASA programs.

Disincentives in the NASA Awards System

Having discussed the awards system earlier, and the respondents' relative familiarity with it, they were then asked, "Are there any aspects of these awards that could prevent them from being effective as motivators?" (question 59). About half (50 percent of the technical monitors, 50 percent of the principal investigators, and 47 percent of the active group) could not think of any disincentives concerning the awards system and its relation to New Technology Reporting (see Table 62, Appendix A-32). Among the other answers given the two most frequent were: the award amount is too small (15 percent of technical monitors, 10 percent of principal investigators, and 38 percent of the active group), and the award process is faulty or lacking in some other respect (19 percent of the technical monitors, 10 percent of the principal investigators, and 9 percent of the active group). Specific comments about the "faulty" process most often related to information not getting down to the interested parties in time, some awards appearing to be made in an arbitrary fashion, use of awards in an inappropriate fashion, and a lack of clear understanding as to what the criteria are for specific awards. One sidelight is worth noting: in the course of the interviews several dozen respondents indicated that they were unaware of the availability of awards for publishing in NASA Tech Briefs or that they did not know the amount of the award.

Rating of NASA's New Technology Reporting System

The majority of respondents judged NASA's New Technology Reporting system to be good or excellent (see Table 69, Appendix A-38). One-fourth of the respondents judged the system to be fair, poor, or very poor.

RATING OF NASA'S NEW TECHNOLOGY REPORTING SYSTEM
(Derived from Table 69, Appendix A-38)

	TM	PI	AG
Excellent	10%	11%	24%
Fair, poor, very poor	24%	22%	24%

It may be noteworthy that more of the respondents judged the New Technology Reporting system to be only fair or less compared to those who judged it excellent. When asked why they rated the system as they did (question 69), the highest three answers were in a positive vein: the system is in place and emphasized by NASA (from 26 percent to 36 percent); the system fulfills its purpose, it works (from 12 percent to 31 percent); and the program is visible (10 percent to 22 percent). Only one of the highest rated four reasons was negative and that was the feeling that it could be better or used to be better (from 11 percent to 19 percent).

In cross-tabulations matching the ratings with the reasons given, there was a close balance between the reasons given for judging the system as excellent or for judging it as fair or less. Among the top three reasons given for rating the New Technology Reporting system as excellent were that it fulfills its purpose, it is a visible program, and it is established and emphasized by NASA. Among the most frequently selected responses for judging the system as fair or less were: lack of visibility, awareness, relevance; could be better, used to be better; not backed or emphasized within NASA; and not a good system, it doesn't work. (See Table 71, Appendix A-39.)

Taking A More Active Role in New Technology Reporting

At different points in the interview questions were posed that sought to reveal the respondents' perceptions about their roles in the New Technology Reporting system, their reasons for their respective levels of participation, and what might encourage them to be more active. One of the first questions related to the respondent's perspective of the New Technology Reporting system and his or her part in it. They were asked, "Why would a person with your responsibilities take a very active role in the New Technology Reporting system?" (question 44). The heavy emphasis in the open ended reply was that if it were part of the job responsibility it would encourage more involvement. This reason was given by 43 percent of the technical monitors, 36 percent of the principal investigators and 44 percent of the active group. Next in order of importance were: recognition, awards, career development; to see technology reported and used; and personal satisfaction. (See Table 47, Appendix A-24.)

In a related question, those respondents who admitted that they did not actively promote the reporting of new technology gave a wide variety of an-

swers (question 47). The most frequent ones related to the respondent's perception of having no real opportunity to report because of either the nature of the job or the fact that there had been no new technology to report. Others indicated that they worked alone, had not thought about it, were unaware of the system, or believed that the requirement was well established and needed no personal attention.

In questions 60 and 61 the respondents were asked to describe, respectively, what would most encourage them to take a more active role in New Technology Reporting and what would prevent them from doing so. On the side of encouragement, the responses most frequently given were: award, recognition, credit, and nothing. This latter answer was the one given most frequently by those in the active group, and may very well mean something different for that group than it does for either the technical monitors or the principal investigators. Typically, the active group meant that they already are heavily engaged and that they are willing to do more without further stimulation. In at least some instances, technical monitors or principal investigators indicated that, regardless of the current level of activity, no particular effort to further stimulate action on their part would result in additional activity. Other answers which collected substantial backing were: part of the job, a requirement; working yields something to contribute; and make more time available, less red tape. (See Table 63, Appendix A-33.)

In terms of barriers to more active participation, the respondents rated lack of time as the most frequent barrier (for technical monitors 39 percent, for principal investigators 55 percent, and for the active group 38 percent). Again, a substantial minority (from 33 percent among technical monitors to 12 percent among active group) could think of no barriers. (See Table 64, Appendix A-34.)

Among the series of answers relating to the respondents' motivation to participate, one should not overlook the importance of non-monetary benefits. In discussing or exploring their answers most respondents emphasized the sense of personal and professional satisfaction that comes from doing a good job and being a part of a productive, worthwhile activity. Recognition, whether or not monetary, appears to be an effective motivator.

Ways to Motivate Marginal Participation

The last question in the interview was, "There are some people at NASA who do not participate in the New Technology Reporting system. How might they be motivated to participate?" (question 70). Again, there was no prompting of the respondents; their answers were open ended and reflected their views after having considered the topic in substantial detail throughout the course of the interview. The most prominent suggestion was to initiate publicity and education to increase awareness (51 percent of technical monitors, 40 percent of principal investigators, and 59 percent of the active group). Next in order of significance were: management emphasis, support, encouragement, even a formal directive (30 percent of technical monitors, 36 percent of principal investigators, and 31 percent of the active group); higher monetary awards, recognition; and make available time and resources. (See Table 72, Appendix A-40.)

Observations and Conclusions

The function of New Technology Reporting is embedded within the larger responsibility for the technical monitoring of a contract or grant. Within this larger context of contract technical monitoring, the respondents--and particularly the technical monitors--demonstrated the relevance of the function to them. This relevance was more firmly demonstrated with specific reference to New Technology Reporting through the answers to questions specific to New Technology Reporting (questions 33-70). When one reviews the responses in aggregate, it is apparent that the respondents seek to associate themselves positively with the function. Moreover, the respondents expressed a willingness to increase their participation in New Technology Reporting, especially if assisted through improved information about the NTR system, coupled with encouragement from agency, Field Center, and work unit management. (See Tables 47, 63, 64, and 72, Appendix A.)

The quantitative results regarding awareness or knowledge about the system of reporting new technology, as well as degree of participation, require some caution in interpretation (especially Tables 36-39 and Table 49, Appendix A). The probes that explored the reasons why they gave their answers regarding the adequacy of information about New Technology Reporting and the understanding of the schematic layout of the New Technology Reporting system, followed by specific questions on how they were involved in the personal promotion of reporting or publishing, all reveal a rather dramatic drop in ability to give meaningful answers. This suggests a tendency on the part of the respondent to claim a higher degree of awareness, knowledge, and participation than actually exists.

Quite apart from the tendency to exaggerate awareness, understanding, and participation, the tabular data reveal a weakness, most pronounced among technical monitors, with respect to awareness, understanding, and participation in the system of reporting new technology. This is important, as these data confirm an earlier qualitative observation that technical monitors, as a group, do not have sufficient information about the system, its value to NASA, or how it was intended to work that would permit them to fulfill the objectives originally intended regarding this reporting function. From the initial establishment of the system for reporting new technology to support the transfer of technology, it is clear that the keystone for a successful system has been that individual who has technical reporting and monitoring responsibility on behalf of NASA for either a contract/grant or in-house technical activity. To the extent that such individuals are not overtly made aware of the basic mechanics of the system, its objectives, and its broad purposes, those individuals are hampered in fulfilling their role. This is apart from any motivation or stimulation that might be provided to encourage these persons to participate <u>actively</u> in seeking out and reporting new technology.

This survey further reveals that from the perspective of the key participants (technical monitors and principal investigators), the incentives for active participation are few, not well publicized within NASA, and may be inadequate to meet the purposes for which they were established. The awards system needs serious review in relation to how it furthers New Technology Reporting. Additionally, more systematic consideration needs to be given to how the formal award system is integrated to mutually support other means of recognition to strengthen the reporting of new technology.

In spite of the general tendency among the repondents to avoid criticism of NASA, their respective Field Centers, or immediate management, their answers reveal a lack of management attention or emphasis to the New Technology Reporting function. Admittedly, the function is very much a secondary one, often considered just another bit of administrative trivia. Those most familiar with technology transfer activities, that is, the active group in this survey population, were particularly sensitive to the lack of management support and attention. In a related sense, their colleagues among the technical monitors--although not identifying this weakness to the same extent in direct criticism--supported the importance of this aspect to the success of the system by identifying management considerations (such as support, acknowledgement, job responsibility, and resources) as important elements to stimulate more active participation on their part.

It is important to note that instances were given to the interviewers in virtually every Field Center where one or more supervisors took an adversarial stand against technical monitors or principal investigators who sought to pursue the reporting of new technology more aggressively. Thus, the problem is not just a passive failure of management to bring any attention to bear on the reporting of new technology; it involves at least some instances of active opposition to the conduct of the function in other than a purely mechanical fashion.

Finally, irrespective of the numerous barriers and the relative degree of inattention existing, there appears to be a broad reservoir of willingness among technical monitors and principal investigators to put more personal effort into the reporting of new technology. However, it is clear that these individuals are not going to buck the system to do so. They need at least some modest, positive encouragement from the formal management structure, a modicum of recognition, and some reasonably detailed systematic information which authoritatively describes the system, its operational standards, its goals, and its value--to NASA as an agency, to the individual participants, and to the American economy.

CHAPTER 4: TECHNOLOGY TRANSFER

Technology transfer is the larger milieu within which the reporting of new technology is a critical element. However, as noted in the previous chapter, the process of contract technical monitoring is a somewhat different context in which New Technology Reporting also is embedded. Both general functions were used as routes through which the respondents could comment upon specific issues surrounding the reporting of new technology. Beyond this, a substantial number of questions were directed to the function of technology transfer because this is the function that is served by New Technology Reporting. And it is within the context of technology transfer that the reporting of new technology has its meaning and importance. The interviews revealed what the respondents thought about the relationship of technology transfer and reporting of new technology, as well as a number of organizational and management issues which facilitate or hinder the technology transfer function within NASA.

Like the previous chapter, the exploration of technology transfer within the context of this survey will be discussed in terms of three dimensions: (1) saliency, (2) knowledge--personal involvement, and (3) motivation.

Saliency

Questions 1 and 7-9 were especially directed toward the issue of saliency (see Appendix B). In the very first question respondents were asked to list and to describe the various tasks that they are expected to do in their jobs. The purpose of this question was to determine the extent to which the respondents spontaneously associated technology transfer (and New Technology Reporting via contract technical monitoring) as being a part of their jobs. None of the group showed much affinity for technology transfer. The highest proportion of mentions of technology transfer occurred among the active group (six percent) followed by the principal investigators (two percent) and technical monitors (one percent). (See Table 1, Appendix A-1.) It should be noted that these responses were "cold." The respondent was given no information to suggest that the focus of the interview would be either technology transfer or New Technology Reporting, so their responses were spontaneous. The next opportunity for the respondents to deal with technology transfer as a part of their jobs was when the question was asked, "Of these various tasks that you are expected to do in your job, what do you consider the primary ones?" (question 4). Although a small minority of the respondents previously had indicated technology transfer as a part of their jobs, none of them listed it as a primary task in answer to question 4 (see Table 4, Appendix A-1).

If the respondent had not mentioned technology transfer in response to question 1, respondents were handed Card 1 (see Appendix B-11) which was a definition of technology transfer as follows:

> Technology transfer, as used here, means the process by which technology developed for or in conjunction with a specific use is applied to another purpose or in a different setting. A simple example is the "spinoff" of a microelectronic device from a rocket control function to an automotive application.

They were then asked if they considered technology transfer to be part of their job (question 7). The majority of those who had not already indicated so in the first question replied "yes." The smallest percent was that for technical monitors (66 percent), then for principal investigators (71 percent), with the highest being the active group (80 percent). This question was followed with probing of why they had not mentioned technology transfer before (question 8). Although numerous answers were given, most of them fell under the explanation that technology transfer was an understood or implicit part of the job. Sixty percent of the technical monitors, 69 percent of the principal investigators, and 42 percent of the active group identified this as a primary reason why they had not previously mentioned technology transfer. Their answers were expressed in such terms as ever present task, normal part of the work, natural fallout, and end product of the job. On the negative side 17 percent of the technical monitors, 21 percent of the principal investigators, and 12 percent of the active group indicated that the nature of their particular work was not conducive or not relevant to participation in technology transfer. (See Table 8, Appendix A-3.)

Finally, of those who answered question 7 that technology transfer was not part of their job, the largest number clustered around the reason that this function was not in their job description--38 percent of the technical monitors, 42 percent of the principal investigators, and 67 percent of the active group. A substantial group of principal investigators and technical monitors (58 percent and 38 percent, respectively) gave as their reason that there was little opportunity to become involved in technology transfer due to the nature of their work. Frequently, the principal investigators who were scientists described their work as "basic reasearch," having no immediate apparent application and, therefore, not applicable to the technology transfer function.

In spite of the lack of spontaneous demonstration of the saliency of technology transfer, the vast majority of the respondents showed awareness after specific prompting (Card 1 and question 7). Obviously, this may have colored their answers; even so, it reveals an eagerness by the respondents to associate themselves with the technology transfer function in a positive fashion.

Knowledge--Personal Involvement

Three areas will be explored in the discussion of the respondents' knowledge and personal involvement in technology transfer activities: (1) familiarity with technology transfer activities, (2) the adequacy of information regarding technology transfer activities, and (3) personal involvement in technology transfer activities.

Familiarity With Technology Transfer Activities

The respondents were asked degree of familiarity with technology transfer activities (question 10). Approximately three-quarters or more of all respondents answered that they were "quite" or "somewhat" familiar. All of the active group responded positively. The least familiar, by answering "little or no," were the technical monitors (26 percent). (See Table 10, Appendix A-3.) A higher proportion of the technical monitors answered that they had little or no familiarity as did those who answered that they were quite familiar.

They were then asked to name their sources of information about technology transfer (question 11). Of the 146 respondents, 67 named the Field Center Technology Utilization Office as a source of technology transfer information. The proportion ranged from a low of 33 percent of technical monitors, to 45 percent for principal investigators, and 75 percent for the active group. It should be remembered that the active group is presumed to be the most knowledgeable about technology transfer matters, and is most likely to have contact (even close contact) with the Field Center Technology Utilization Office. Tied for second as the next most often mentioned source of information about technology transfer were two of NASA's national publications. Spinoff was mentioned by 29 percent of the technical monitors, 26 percent of the principal investigators, and 25 percent of the active group. NASA Tech Briefs was mentioned by 25 percent of the technical monitors, 26 percent of the principal investigators, and 34 percent of the active group (see Table 11, Appendix A-4).

Although familiarity generally is quite good, those that clearly have the least familiarity with technology transfer activities in NASA are the technical monitors.

Adequacy of Information Regarding Technology Transfer

Almost 90 percent of the respondents said that the information reaching them about technology transfer was at least somewhat or quite adequate (question 12). As in the case of familiarity, the technical monitors were least satisfied with the information reaching them--13 percent indicated that the information was "not at all" adequate (see Table 12, Appendix A-5.)

On the question of why information was either adequate or not adequate (question 13), the response most selected by all respondents was "knows enough, gets enough to solve problems." Just over 44 percent of the technical monitors gave this as a reason, as did 50 percent of the principal investigators and 44 percent of the active group. The second most selected reason was a "negative" reason related to insufficient information described as "lack of knowledge or awareness." Here, 25 percent of technical monitors selected this answer as did 21 percent of the principal investigators and 19 percent of the active group (see Table 13, Appendix A-5). Among others who felt they were not receiving sufficient information, reasons given were: not discussed much or not addressed at meetings, "have to go searching for information, or not doing a good PR job.

A cross-tabulation comparing the level of adequacy with reasons for selecting that level revealed that among those rating the adequacy as quite adequate, 71 percent selected the reason of "knows enough," while 22 percent cited "general agency efforts outside of the Technology Utilization Offices activities, to make people aware." Among those who rated the adequacy of information not at all adequate, the principal answers given were lack of knowledge or awareness could be better, or used to be better, and lack of involvement or participation.

As in the case of familiarity, the respondents generally saw information on technology transfer as adequate, but a substantial minority (about 25 percent) felt that they lacked knowledge and awareness. Again, it was the technical monitors who expressed this need.

Involvement in Technology Transfer Activities

The first area covered dealt with participation by the respondents in technology applications projects (questions 24-26). These were defined specifically as technology transfer applications projects for which at least partial funding was arranged through the Field Center Technology Utilization Office. There may be as many as 10 or 12 active projects of this nature in any given year, but since the funding is quite limited, such opportunities are rare, and it was not anticipated that very many of the respondents would have had such experience. This proved to be true. Among technical monitors, 21 percent indicated that they had participated in such applications projects, while 19 percent of the principal investigators had and 62 percent of the active group had. Of the technical monitors and principal investigators who had been involved in applications projects, most had been in no more than one or two. On the other hand, the active group had participated more extensively in these projects (see Table 27, Appendix A-14).

The other area of active participation was consultation and inquiries (questions 27-30). The respondents were asked, "Have you consulted or handled inquiries from outside NASA that involved technology transfer?" A high proportion answered "yes," from a low of 71 percent for principal investigators, to 74 percent for technical monitors, to 94 percent for the active group. Relating the number of times per year that the respondents dealt with such consultation or inquiries produced a substantial scatter (see Table 30, Appendix A-15). There was a clustering around one, two, or three times, although 27 percent of the active group indicated that they handled 21 or more such inquiries.

Although there is widespread acknowledgement of participation in technology transfer activities, particularly in the consultation and handling of inquiries from outside, the interviewing team believes that the handling of inquiries may tend to be overreported on the part of technical monitors and principal investigators. A substantial minority of them appeared to be interpreting the handling of inquiries as answering questions about their particular scientific or engineering project from someone outside of NASA or not related to a particular contract effort. These inquiries probably relate more to the exchange of technical information among peers working on similar problems rather than a "spinoff" type of opportunity.

Motivation

Seven areas will be explored within the context of motivation: (1) the extent to which technology transfer is or is not a part of the job, (2) the emphasis upon technology transfer (by the agency and the work unit), (3) how NASA benefits or suffers from technology transfer performance, (4) the pressure by NASA to promote technology transfer, (5) involvement in technology transfer activities with respect to the reasons for involvement and personal benefits derived, (6) motivations, both positive and negative, to be active in technology transfer activities, and (7) an assessment of NASA's technology transfer efforts.

Technology Transfer--A Part of the Job or Not?

It previously has been demonstrated that technology transfer has a low level of saliency when the respondents spontaneously are asked to describe "the various tasks you are expected to do in your job." Yet among those not mentioning technology transfer, from 66 percent (of the technical monitors) to 80 percent (of the active group) said that technology transfer was a part of their job, when presented with a description of this activity. On the other hand, 34 percent of the technical monitors, 29 percent of the principal investigators, and 20 percent of the active group specifically said that technology transfer was not a part of their job. When those who said that technology transfer was a part of their job were asked, "Why didn't you mention technology transfer as part of your job before?" (question 8), the majority said it is understood to be an implicit part of the job, it is not a separate task, it happens "naturally."

For those who acknowledged technology transfer as part of their job, but had not mentioned it initially, between 12-21 percent said that the nature of their work (basic research, not hardware oriented, etc.) made them not mention technology transfer. Still others said that technology transfer was just a small part of their job, a secondary effort, and did not have top priority.

The respondents appeared to be highly task motivated. Their motivation to engage in technology transfer activities seems to be influenced by whether or not they included these activities as being an integral "part of my job."

Emphasis Upon Technology Transfer

NASA's emphasis on technology transfer can serve as a motivational stimulus. Respondents were asked, "Taking NASA as a whole, does the agency give a great deal of emphasis to technology transfer, some emphasis or little or no emphasis to it?" (question 14). The highest proportion of respondents (from 48 percent for the active group to 61 percent for the technical monitors) answered "a great deal." The ratio of respondents answering "a great deal" in comparison to "little or no" was 81:10.

In responding to the question of why a particular emphasis had been selected (question 15), the biggest response was "awareness and evidence of organized technology transfer effort," which was selected by 47 percent of technical monitors, principal investigators, and the active group. The next most highly selected reason was that the "goal fits in with the job," ranging from 11 percent by technical monitors to 19 percent by principal investigators, and 16 percent by the active group. The third most selected answer was a "negative" reason that it "could be better or used to be better," selected by 12 percent of the technical monitors, 2 percent of the principal investigators and 22 percent of the active group. This reason was the second highest given by the active group who tend to be most knowledgeable about technology transfer activities among the respondents. (See Table 16, Appendix A-7.)

In the cross-tabulation of level of emphasis by the reasons why, 57 percent of those who indicated that NASA gives a great deal of emphasis to technology transfer said they gave that answer because it was well publicized and visible; 21 percent gave that answer because technology transfer was treated seriously, was a required activity, and was a goal that fit in with

their jobs. Among those who claimed that NASA gave little or no emphasis to technology transfer, 60 percent said it was not visible enough, that there was little or no knowledge or awareness of the activity, and that it could be and often was ignored. More than the other respondents, the active group seems to be critical of NASA's emphasis or support given to the technology transfer function.

The focus then shifted from agency-level emphasis to that of the respondent's work unit within the Field Center. While about half or more of the respondents said that NASA gave a great deal of emphasis to technology transfer, only about one-third said that the same was true of their respective work units (see Table 18, Appendix A-8). A considerably higher portion of the respondents rated their work unit emphasis as little or no compared to NASA as a whole.

WORK UNIT EMPHASIS UPON TECHNOLOGY TRANSFER
(Derived from Table 18, Appendix A-8)

	TM	PI	AG
Great deal	32%	39%	31%
Little or no	24%	23%	31%

It should be noted that those who are most active are also among the most critical regarding the level of emphasis in the Field Center work unit (equalling the number who believe that there is a great deal of emphasis).

In the cross-tabulation matching the degree of emphasis with reasons for selecting that emphasis, there were three highlighted reasons in both the "positive" and "negative" categories (see Table 20, Appendix A-10). Among those who said that technology transfer received a great deal of emphasis in their work unit:

- 41 percent said that technology transfer activity was encouraged and supported;
- 25 percent said that the system works and is visible; and
- 18 percent said that the system is compatible with the work unit's primary responsibility.

For those who said that technology transfer received little or no emphasis in their work unit:

- 43 percent said this was due to the nature of the unit's work (such as basic research, not involved with hardware, produce software, etc.);
- 30 percent said technology transfer was not encouraged, it was de-emphasized, had a low priority, had to be done on one's own time, or management was resistant; and
- 27 percent said that there was little or no knowledge of the system.

A comparison of answers regarding emphasis by NASA, as an agency, to the respondent's work unit emphasis revealed a continued increase among those who judged the emphasis to be "little or no" as one moved from the agency to the Field Center work unit level.

AGENCY EMPHASIS COMPARED TO WORK UNIT EMPHASIS ON TECHNOLOGY TRANSFER

	Agency		
	Great deal	Some	Little or no
Work Unit			
Great deal	47%	14%	--
Some	33%	57%	30%
Little or no	20%	29%	70%

These data strongly suggest that the work unit level is an area that deserves concerted attention with respect to motivating individuals to participate in technology transfer activities.

How NASA Benefits or Suffers From Technology Transfer Performance

There was substantial consensus among the respondents concerning how NASA benefits resulting from successful technology transfer. When asked, "How does the agency benefit from its technology transfer activities?" (question 18), 78 percent of the technical monitors, 62 percent of the principal investigators and 88 percent of the active group replied that a positive public and political image resulted, budget support was developed, there was demonstration of the effective use of taxpayer money, and industry advocates were developed. This appreciation for the public relations value of technology transfer is even stronger than that for reporting new technology. It is noticeable that such a high proportion of respondents acknowledged this value of technology transfer activities.

Another benefit to NASA was the mutual exchange of technological information that occurs, being kept in touch with user needs and thereby stimulating the industrial base of NASA, gaining access to technology from sources outside NASA, and developing more productive, technologically sharp engineers and scientists. This reason was cited by 15 percent of the technical monitors, 38 percent of the principal investigators, and 19 percent of the active group (see Table 21, Appendix A-11). Finally, from 9 percent to 14 percent of the respondents claimed that NASA projects work better, are more efficient, are more economical, and are more credible or reliable because of technology transfer activities.

Probing the opposite side, and asking the respondents how NASA suffered from poor technology transfer performance (question 19), the results were almost the exact opposite of the benefits. From 67-81 percent of the respondents indicated that poor technology transfer would result in a loss of public and political image, bringing with it loss of support, budget cuts, and a diminuition of NASA accomplishments. A smaller group consisting of 11 percent of the technical monitors, 31 percent of the principal investigators, and 19

percent of the active group said that NASA would suffer from underperformance, would lose problem solving ability and creative force, and have greater program risk. Finally, between 9-29 percent of the respondents suggested that NASA would become isolated, yet little outside feedback, resulting in stagnation of its state-of-the-art capability. (See Table 22, Appendix A-11.)

Pressure From NASA to Promote Technology Transfer

It is possible that NASA efforts to promote technology transfer could be perceived as "pressure." Respondents were asked, "Does NASA put too much pressure, too little pressure, or just about the right amount of pressure upon its scientists and engineers in its efforts to promote technology transfer activities?" (question 22). Only three of 142 responding to the question said too much. On the other hand, 34 (representing 25 percent of the technical monitors, 12 percent of the principal investigators, and 38 percent of the active group) said there was too little pressure.

Among those who said there was too little pressure, reasons given were:

- o more encouragement is needed for management;
- o despite incentives individuals are not rewarded for trying but not succeeding; and
- o there is not sufficient stimulus, technology transfer is not focused upon scientists and engineers, one learns over a time of its benefits.

Involvement in Technology Transfer Activities--Reasons and Personal Benefits

Among those involved in technology applications projects, one of the reasons most often given was that such involvement was part of the job (technical monitors 33 percent, principal investigators 50 percent, and active group 40 percent). A second reason was that it was due to their particular expertise (technical monitors 47 percent, principal investigators 12 percent and active group 35 percent). Another important reason was their participation on the basis of personal interest (technical monitors 7 percent, principal investigators 25 percent, and active group 15 percent). And finally, they participated because of contact with their colleagues (technical montitors 7 percent, principal investigators 25 percent, and active group 15 percent). (See Table 28, Appendix A-14.)

Of those who engaged in answering inquiries or consulting with others outside of NASA regarding technology transfer activities, the primary reason given for participation was their expertise (technical monitors 76 percent, principal investigators 83 percent, and active group 87 percent). A more distant second reason was it was part of the job responsibility (19 percent for technical monitors, 7 percent for principal investigators, and 20 percent for the active group). And then came contact with colleagues (13 percent for technical monitors, 13 percent for principal investigators, and 7 percent for the active group).

Respondents were asked how they personally benefitted from these activities (question 30). The highest proportion cited personal satisfaction, (technical monitors 51 percent, principal investigators 37 percent, active group 63 percent). Other reasons given were: professional satisfaction, (technical monitors 17 percent, principal investigators 23 percent, and active

group 33 percent); none or minimal benefits (technical monitors 24 percent, principal investigators 20 percent, and active group 13 percent); and recognition or reward (technical monitors 13 percent, principal investigators 20 percent, and active group 27 percent).

For the most part, the benefits tended to be more of a psychic than monetary nature. A personal and professional sense of satisfaction from "doing good," and organizational recognition of that is important to the respondents.

Motivation to be More Active in Technology Transfer

The respondents were directly asked, "What motivations or personal benefits would make you, as a NASA scientist or engineer, take a very active role in technology transfer activities?" (question 20). The largest number of respondents said personal satisfaction (24 percent for the technical monitors, 26 percent of the principal investigators, and 38 percent of the active group). A second reason given by 35 of the respondents was awards, recognition, or credit (ranging from 21 percent among technical monitors to a high of 28 percent among the active group). A third reason selected by 16 of the respondents was to stay sharp and in the forefront technically (given by 10 percent of the technical monitors and 21 percent of the principal investigators but none of the active group). Finally, 18 respondents said they would be motivated because participation was part of the job, a requirement, (selected by 15 percent of the technical monitors, 7 percent of principal investigators, and 12 percent of the active group). Personal satisfaction or recognition is seen to be most important to the active group, while the technical benefits seem most attractive to the principal investigators, and the relationship to the job and its requirements are more attractive to technical monitors than to other respondent groups.

With respect to barriers or disincentives to active participation in technology transfer, those interviewed were asked "What would prevent you from taking a very active role in technology transfer activities?" (question 21). The answer given by the largest group (62 respondents) was lack of time available (44 percent of technical monitors, 38 percent of principal investigators, and 44 percent of the active group). Second came the lack of management support (selected by 21 percent of the technical monitors, 21 percent of the principal investigators, and 25 percent of the active group). Finally, 23 respondents cited lack of incentive or personal interest (12 percent of the technical monitors, 17 percent of the principal investigators, and 22 percent of the active group). Other disincentives mentioned included the unavailability of resources, the lack of opportunity to develop innovations, and barriers to the free exchange of communications. (See Table 24, Appendix A13.)

Rating NASA's Technology Transfer Effort

One aspect of motivation can be found in the degree to which individuals identify a program as being a strong viable one. The question was asked, "Thinking back over all of the matters we have discussed about NASA's technology transfer activities, how would you evaluate this effort: excellent, good, fair, poor, or very poor?" (question 31). Most (ranging from 47 percent of the active group to 58 percent of the technical monitors to 64 percent of the principal investigators) rated NASA's efforts as good. If one eliminates this

"middle ground" and puts the remaining answers in the categories of "excellent" or "fair or less" the results are as follows:

EVALUATION OF NASA'S TECHNOLOGY TRANSFER EFFORTS

	TM	PI	AG
Excellent	20%	19%	40%
Fair or less	22%	17%	23%

Within these two categories the split is almost equal, with the more critical view being given by the technical monitors and the more favorable view by the active group.

When asked to give reasons for their particular rating, three of the four highest responses were positive and one was negative. The highest (40) was that technology transfer was a visible program (selected by 31 percent of the technical monitors, 31 percent of the principal investigators, and 16 percent of the active group).

The reason "a system is in place and emphasized by NASA" was given by 38 respondents representing 21 percent of the technical monitors, 33 percent of the principal invetigators, and 28 percent of the active group.

A third positive reason given was that it fulfills its purpose and works, given by 23 respondents representing 14 percent of the technical monitors, 12 percent of the principal investigators, and 25 percent of the active group. Finally, the negative reason given was that it could be better or it used to be better, selected by 29 respondents representing 25 percent of the technical monitors, 17 percent of the principal investigators, and 12 percent of the active group. (See Table 34, Appendix A-17.)

A cross-tabulation of the rating by reasons given revealed that the major reasons given for saying that NASA's technology transfer is excellent were:

- o NASA emphasizes its importance (42 percent);
- o the activity is visible, providing good publicity (42 percent); and
- o the activity is effective, fulfilling its purpose (26 percent).

The key reasons given as to why technology transfer activities were fair or less were:

- o lack of visibility and familiarity (nearly 40 percent);
- o the system does not fulfill its purpose, NASA is not getting enough out of the system, it's a bother (approximately 14 percent); and
- o not emphasized within the Field Center or given a low priority (approximately 18 percent).

(See Table 35, Appendix A.)

Observations and Conclusions

Generally, the respondents were not consciously aware of technology transfer in relation to their responsibilities until they were prompted by the definition of technology transfer and the direct question as to whether or not technology transfer is a part of their jobs. (See Table 7, Appendix A-2.) A key factor here is that technology transfer was perceived as being an organizational, job-related requirement. One-third of the technical monitors interviewed, however, do not consider technology transfer to be a part of their jobs.

Most respondents claimed familiarity with the technology transfer function. Again, however, the lowest rating was among technical monitors. Compared to the active group and principal investigators, technical monitors clearly were less familiar with the Technology Utilization Office which usually is the center of technology transfer activities in the Field Center.

As the interview proceeded to deal with technology transfer in greater detail, it was the technical monitors (as a group) that reflected the least satisfaction with the adequacy of information regarding technology transfer activities. They led the other two groups of respondents in stating that they perceived the lack of knowledge or awareness about such activities. (See Table 13, Appendix A-4.)

There was broad agreement among the three groups of respondents that there is much less emphasis on technology transfer activities at the Field Center work unit level than there is within NASA as a whole. In fact, 25 percent of the technical monitors viewed NASA's emphasis or pressure in promoting technology transfer as being "too little." (See Table 25, Appendix A-13.)

When considering the kind of benefits that individual scientists or engineers might derive from participating in technology transfer activities, technical monitors were more likely to see minimum benefits or no benefits from such participation. However, like their peers in the principal investigator and active group samples, they expressed a willingness to participate more in such activities--if technology transfer were made a part of their job description as a clear element required by management, and if some organizational recognition were involved. Technical monitors also were likely to see room for considerable improvement in NASA's technology transfer activities.

Although technology transfer is not frequently a conscious concern of most NASA scientists and engineers, it is embraced by the large majority as being important to NASA when the topic is specifically presented to them. There is an underlying belief, revealed by the aggregation of answers in the survey, to the effect that greater participation in technology transfer activities will be achieved when there is more formal and overt acknowledgement by NASA management. This will require active support throughout various management levels, especially the first and second levels of supervision.

CHAPTER 5: OPPORTUNITIES FOR ACTION

The Denver Research Institute's 1985 study on the reporting of new technology, NASA's New Technology Reporting System: A Review and Future Prospects, observed that the number of New Technology Reports has declined substantially. In the six years from 1979-1984 the number of reports annually submitted dropped from 1,475 to 712. Unless this trend is substantially reversed, the highly successful publication NASA Tech Briefs will soon be without quality material, and could face the possibility of having to be discontinued. It is vital to emphasize both quantity and quality because the whole purpose behind the NASA Tech Briefs operation, which is sustained by the reporting of new technology, is to provide useful technology to American industry, universities, and public entities as a spinoff from NASA's research and development efforts.

That 1985 study also revealed that very little has been done in the past 10 years to support or strengthen the New Technology Reporting system. In fact, it has suffered from reductions in personnel and other administrative management actions. To some extent the system has suffered from what could be characterized as benign neglect. Yet, NASA still retains the source of strength from which a revitalized system for reporting of new technology can rise--the concern and skills of its scientists and engineers.

Basic Findings

The primary findings of this study relate to the topics of: (1) awareness and understanding, (2) management support, (3) incentives, (4) the role of technology transfer, and (5) willingness to participate. Each of these will be highlighted in terms of the survey results, supplemented by the qualitative comments made to the interviewers by the respondents as well as observations of the interviewers based on discussions with respondents both prior to and following the formal interview.

Awareness and Understanding

The survey revealed a generally poor awareness and understanding of the New Technology Reporting system. Although the respondents professed knowledge about the system ranging from 69 percent of the active group to 79 percent of the principal investigators, more detailed questions about the system that arose later in the interview revealed a substantially lesser familiarity with the operation of the system. (See Tables 36-46, 48-52, 60, 61, 67, and 68, Appendix A.) Respondents judged the adequacy of information reaching them about New Technology Reporting as marginal at best, with both technical monitors and the active group (25 percent of each) saying that this information is "not at all" adequate. Their collective judgment is that the basic reason for lack of awareness or understanding is they did not receive adequate information in the first place. There is a clear failure of most respondents, particularly the technical monitors and principal investigators, to perceive their role as an active one--in contrast to the expectations illustrated by the literature and guidelines produced some years ago to describe the system and its operation. (See Table 44, Appendix A-23.) In the final question, where the respondents were asked how more individuals might be motivated to become active in the New Technology Reporting system, the largest number

replied "publicity and education to increase awareness." Obviously, they believe that a principal shortcoming is the relatively low visibility and basic knowledge about the system generally, but especially for those who are supposed to serve as principal actors in the system.

Management Support

In spite of some reluctance to criticize, the respondents revealed a strong belief that management support for the New Technology Reporting function is weak or nonexistent. They perceived that the most emphasis is given at the agency level (even though this is not great). Perception of emphasis dropped off quickly as one approached the work unit within the Field Centers.

Only occasionally was a specific comment made about a division or office head even mentioning the reporting of new technology, let alone giving encouragement to it. When responding to the question "How much emphasis does your work unit give to the New Technology Reporting system?" technical monitors responded "a great deal" in 19 percent of the cases and principal investigators 17 percent. Given the tendencies of individuals to seek the middle ground and reply "some" even when such emphasis is virtually lacking, these responses suggest that management support for the system within the Field Centers is a serious problem. (See Table 56, Appendix A-28.)

Further supporting this finding is the fact that respondents, to an unusual degree, indicated a lack of pressure by NASA to promote the New Technology Reporting system. Further, in answering questions regarding what would encourage them or prevent them from taking an active role in the New Technology Reporting system, respondents frequently mentioned factors tied to the prerogatives of management: management support, making time available, recognition, requirements of the job, making resources available, and removing red tape. (See Tables 63 and 64, Appendix A-33/34.)

Incentives

Many of the responses regarding incentives centered around the awards system which is available for recognizing participant performance in the New Technology Reporting system, though not exclusively attached to this function. In addition, numerous comments related to the general management environment within the agency or particular Field Center. The awards system as applied to New Technology Reporting has not been fully or well exploited and could use improvement.

The first problem is visibility. Numerous respondents expressed surprise that there are cash awards for publication in NASA Tech Briefs. And few knew what the amount of the award is. In fact, the award has been raised from $100 to $150, and none of those who discussed the award was made aware that this change occurred. This lack of visibility was mentioned as one of a number of factors that prevent the awards from being effective motivators in the New Technology Reporting system.

Another factor is timeliness. In discussions surrounding questions about the awards system interviewers frequently were told that, after submitting a report for potential publication, nothing further was heard about its progress or status for many months--until they were notified that they were to receive an award.

A third factor is the amount of award. Most of the respondents who have been recipients of the NASA Tech Briefs award indicate that the recognition of receiving the award itself is frequently considered more important than the cash involved. Further, since the Internal Revenue Service withholds 20 percent of the award for tax purposes, the recipient is given a check for $80 (when the award was $100) or now for $120. This practice is not followed in the award made by NASA to contractor employees who receive checks for the full amount. Although not a major criticism, this is one of many little irritations that detract from more active participation in the system.

A noticeable minority of respondents (up to 19 percent in the case of the technical monitors) viewed the award process as faulty--most often as a result of the lack of full understanding of the purposes and process by which the awards are made. (See Table 62, Appendix A-32.)

Finally, one should not overemphasize the formal award system and monitoring incentives. Those responses to questions about willingness to participate highlight non-monetary incentives, or "rewards" such as personal and professional satisfaction, organization acknowledgement and recognitions. (See Tables 23, 24, 47, 63, and 64, Appendix A.)

Technology Transfer

The data from the survey show that the technology transfer function leads that of New Technology Reporting in terms of awareness, understanding, and participation, but it tends to suffer from the same lack of management support as that of the New Technology Reporting function. In each Field Center, a substantial minority of the respondents attested to the fact that management at that location gave due "lip service" to the value and need for technology transfer, but rarely provided encouragement and real management support to these activities in terms of making time or resources available. According to the respondents, there has been a subtle shift over the past five or six years whereby the initiative and burden for participation in technology transfer activities has been shifted from the organization to the individual. This results in such activities being "tolerated," rather than encouraged, and in some instances even discouraged by mid-level management without intervention on the part of senior Center or agency management.

Table 75 (Appendix A-45/46), "Comparisons of Responses to Some Questions Asked About Technology Transfer vs. New Technology Reporting," highlights the relatively more favorable position of the general function of technology transfer vis-a-vis that of New Technology Reporting. This is especially noticeable in terms of awareness and understanding, including the sources for information about the two functions. In terms of any visible pressure to promote technology transfer or New Technology Reporting, the ratio of those selecting "too little" or "too much" is 10:1 for technology transfer vs. 30:1 for New Technology Reporting, indicating considerably less pressure in favor of New Technology Reporting.

Willingness to Participate

Although this survey shows a low state of affairs concerning the New Technology Reporting function, there is reason for optimism. Across the Field Centers surveyed, it is apparent that the rank and file scientists and engineers are willing to participate in the system, to become more active and to

embrace a more positive role to search out reportable items. The first need is a better understanding of the system. Second, NASA's line management needs to make this function a legitimate area of active concern in terms of job performance coupled with an effective system of incentives. This is equally true for participation in technology transfer activities more generally, but it is clear in the responses of all three groups--technical monitors, principal investigators, and the active group--with respect to the reporting of new technology. (See Table 47, Appendix A-24.)

It was apparent to the interviewers, as the discussion drew out more detail about technology transfer activities and the reporting of new technology, that the respondents became more interested and expressed a proclivity to become more active in the process. Few overtly rejected New Technology Reporting as a waste of time. Most expressed the belief that with a little management encouragement the vast majority of technical monitors or principal investigators could be stimulated to be more active and aggressive in reporting new technology. This acceptance as legitimate, and willingness to participate more fully in the New Technology Reporting system by those who are key to its success, is most encouraging. Basically, they believe that most of the obstacles to such participation can be removed or at least neutralized without great effort or cost.

Options to Improve New Technology Reporting

The following options to improve New Technology Reporting flow directly from the results of the study, in conjunction with an understanding of the basic management climate in which the New Technology Reporting system exists. Suggested options are: (1) the immediate development of an education and orientation effort about New Technology Reporting; (2) the mandating by senior agency leadership of management support for the New Technology Reporting function at the agency, Field Center, and work unit levels; (3) more adequate staffing within the Field Center Technology Utilization Offices in support of New Technology Reporting; (4) the establishment of more adequate feedback to participants in the system; and (5) avoiding the use of mechanical or simplistic management goals such as quotas to measure progress.

Education and Orientation

An organized system of education and orientation needs to be developed as soon as possible under NASA Headquarters' leadership to develop the needed awareness and understanding of the New Technology Reporting system both within NASA and among its contractors or grantees. The point of first emphasis must be in-house, as it is these individuals who will provide stimulation and leadership to contractor performance in New Technology Reporting. The orientation and education of contractor personnel need not be delayed, but the effort should be initiated with NASA personnel first.

The content of this effort should be directed at the purpose of the New Technology Reporting system, the value of that system to NASA and to American industry (in excess of $20 million per annum to industry alone), and an overview of how the system should operate. Currently, there is no up-to-date literature, including past examples, that can be provided to either technical monitors or to contractors.

What is needed is attractive material that is brief and to the point, and can receive wide distribution. It can be supplemented by updated regulations or guidelines and simplified reporting forms to be made available to those individuals who monitor technical activities for NASA as well as to those who will be responsive to NASA's supervision. The attractive pamphlet or brochure can be made available more widely, beyond the individuals responsible for New Technology Reporting to key technical supervisors.

Ideally, all supervisory personnel should be given a brief orientation at the beginning of a contract to familiarize themselves with the responsibilities for New Technology Reporting, and at periodic intervals thereafter. It would be helpful if NASA could develop some brief (12-15 minute) videotapes to illustrate how the system works, and some of the dramatic results that the system can produce. It also should illustrate how the New Technology Reporting function fits within the larger technology transfer function and the broad mission of NASA.

At a minimum, NASA should target current technical monitors, supervisors of laboratory or technical programs, and new employees for orientation and education about the New Technology Reporting system.

Management Support

Management support needs to be visible to individuals at the working level. This means that there should be a visible emphasis on the part of NASA leadership from the Headquarters level through senior Field Center management to the various mid-management and supervisory levels at the respective work units. The initiation of such emphasis must be continued with appropriate followup--such as requiring semi-annual and annual reports about New Technology Reporting activities and achievements. Specific points of line management responsibility need to be identified, then enforced, if initial momentum is to be retained.

Serious consideration should be given to making New Technology Reporting (as a part of technology transfer) an identifiable job element in the position description of both technical monitors and supervisors. The study findings show that technical monitors are most likely to be responsive to more active participation in both technology transfer and New Technology Reporting activities when this is tied to a managerial or job requirement. (See Tables 19, 23, 47, 57, 63, 64, and 72, Appendix A.) Consistently, technical monitors view either technology transfer or New Technology Reporting activity as favorable when it is compatible with a work unit's overall responsibilities, when it is part of the job responsibility or requirement, when it is an activity required by management, or when management gives it emphasis or support.

Each Technology Utilization Office among the NASA Field Centers should have a fulltime New Technology Representative to facilitate and support the New Technology Reporting responsibilities of technical monitors and technical supervisors at the Field Center. In most cases, the person acting as the New Technology Representative has numerous other functions to fulfill as well. In some instances, no such representative exists, or it is an additional duty of the Technology Utilization Officer or his administrative assistant (Ames, Goddard, and Johnson). The needed level of technical support to this function cannot be achieved under these circumstances.

One concern or irritation about the operation of the New Technology Reporting system which was offered frequently by those who are active participants in the system is the lack of feedback to participants. They complained about either personally spending considerable time in writing a report of new technology, or encouraging others to do so, then receiving little or no information about the relative status of that report in the review system. Typically, they said that nothing was heard following submission, without their making specific inquiries, until they were informed that the report had not been selected for publication, or that they were going to receive an award for publication. This often was at least 12-18 months after submitting the report, and the respondents attest to the cooling effect this had on their enthusiasm to be aggressive in participation. In order to assure necessary feedback to participants, there needs to be closer liaison and cooperation among Technology Utilization Officers, those responsible for evaluating the reports, and technical supervisors so as to provide timely information on the status of reports. The most likely solution to this is use of an automated tracking system by the Field Center Technology Utilization Office. This approach already is being instituted in several Field Centers.

Finally, in the process of providing improved management support to New Technology Reporting, every effort should be made to avoid the use of numeric quotas. Rarely are these effective in providing more reports of the quality needed to sustain the publication of NASA Tech Briefs. In the mid-1960s some attempts were made to define appropriate expectations in terms of the number of New Technology Reports that should be turned out by contractors or reported through the Technology Utilization Office. Typically the various formulas were based on the number of scientists and engineers assigned to a particular project or activity, the number of dollars committed to the project, and similar inputs.

Participants and observers of that period say that the principal result was a flurry of paper of dubious value. The lower echelons were aware of the "need" to produce a certain number of reports--therefore, that number was equal or surpassed even though the initiators of the reports recognized many of them to be without merit for the purpose intended by the New Technology Reporting system. New technology cannot be mandated. But it does need to be reported, and that requires systematic means for searching to reveal the evidence of such discovery, and the concurrent encouragement by management to the individuals who are most likely to be involved in the discovery and innovation process.

Organizational Climate

NASA faces a variety of challenging circumstances today which would appear to detract from its capacity to undertake even the modest action steps suggested above. The organizational disruption that followed the Shuttle accident put a strain on resources, personal relationships, and organizational continuity. The seeking of scapegoats generated by forces outside the organization tends to create a defensive environment that often is hostile to change of almost any kind. It also makes more difficult the undertaking of any initiatives that do not appear to have a direct effect upon the amelioration or recovery from such an incident.

Another important factor affecting NASA's capacity to deal with the deficiencies in the New Technology Reporting system is the wide difference in

characteristics of its Field Centers. Some, like Ames, Langley, and Lewis, are relatively broad-based Research Centers with a pace and organizational environment somewhere between that of a university and an industrial technical organization. Others like Goddard and JPL focus on research and development related to space flight and space flight support activities. Here, the project orientation is more apparent as is the task-oriented perspective of management. Finally, there are the operations activities such as Kennedy, and the big space flight systems organizations like Johnson and Marshall. Here one finds a constant sense of urgency, especially as time for a particular flight draws near. Most other things receive little attention for the number one priority of flight problem-solving. This tends to fade as a flight is made and completed, but the urgency always is present and a strong influence on organizational priorities. These differences suggest that any action steps to improve technology reporting need to be shaped so as to accommodate these differing characteristics, yet fulfill their respective purposes.

A third circumstance that cannot be overlooked is the general status, including staffing, of the Field Center Technology Utilization Offices. Within the context of any particular Field Center's activities and priorities, the Technology Utilization Office clearly stands at the lower end of the spectrum of attention and concern. Staffing is so stingy that the function virtually is reduced to virtually no activity at all. This is a real, potential danger at both Ames and Johnson following recent retirements. The necessary emphasis to sustain a meaningful New Technology Reporting system will not be achieved without positive attention of Field Center management to the status and staffing of their respective Technology Utilization Offices.

In spite of these difficulties NASA has the capacity, quite easily, to significantly improve its New Technology Reporting function. For it has the will--largely untapped--among its scientists and engineers who stand ready to participate more actively in the system and to make it an effective one. The resources required are minimal. Even if one additional fulltime professional person were added to each Field Center, and additional support activities undertaken, the amount would not exceed $100,000 per Field Center. The educational and orientation effort, standing alone, should make a substantial contribution. However, the real key is management support coupled with the educational effort. Leadership must be made aware of the system and its value to both NASA and American industry. Once that is accomplished a more natural support will flow from both organizational leadership and the technical monitors and principal investigators who are called upon to lead the effort.

It is amazing that, given the paucity of attention and resources, the New Technology Reporting system continues to operate at all. But without further, immediate attention it faces collapse. This survey revealed that relatively simple, inexpensive means can be used to give it new life, expanding its positive impact in terms of benefit both to NASA and the Nation.

APPENDICES

Distribution of Responses Across the Three Respondent Categories
In Percents (Number of Responses in Parentheses)*

	Respondent Categories		
	Technical Monitor	Principal Investigator	Active Group
TABLE 1			
Q1. Mentioned contract technical monitoring or technology transfer among tasks performed on the job?			
mentioned contract technical monitoring	44.4 (32)	14.3 (6)	12.5 (4)
mentioned technology transfer	1.4 (1)	2.4 (1)	6.3 (2)
TABLE 2			
Q2. [If not mentioned in question 1:] Is contract technical monitoring one of your tasks?			
yes	85.0 (34)	61.1 (22)	67.9 (19)
no	15.0 (6)	38.9 (14)	32.1 (9)
TABLE 3			
Q3. [If question 2 was no:] Why not?			
task assigned to others, delegated to subordinates	66.7 (4)	50.0 (7)	55.6 (5)
not part of job, not doing it much anymore	33.3 (2)	50.0 (7)	44.4 (4)
TABLE 4			
Q4. Mentioned contract technical monitoring or technology transfer as a primary task?			
mentioned contract technical monitoring	47.2 (34)	23.8 (10)	28.1 (9)
mentioned technology transfer	--	--	--

*Column headings are the three respondent categories unless indicated otherwise. Percents may add to more than 100% due to more than one answer allowed for some questions.

	Percent (Number) of Responses		
	Technical Monitor	Principal Investigator	Active Group
TABLE 5			
Q5. Why is contract technical monitoring one of the primary tasks?			
contract work important on a continuing basis	44.1 (15)	40.0 (4)	66.7 (6)
involves a lot of time, money, work	38.2 (13)	20.0 (2)	22.2 (2)
contract work important now	14.7 (5)	30.0 (3)	11.1 (1)
just needs to be done, have to keep up with it	2.9 (1)	10.0 (1)	--
TABLE 6			
Q6. Why isn't contract technical monitoring considered an important task?			
minor part of job, secondary, not critical	68.4 (13)	75.0 (12)	81.8 (9)
assigned to others, delegated to subordinates	21.1 (4)	25.0 (4)	--
forgot to mention, subtask to other tasks	--	--	18.2 (2)
other	10.5 (2)	--	--
TABLE 7			
Q7. Is technology transfer [as defined in Card 1] part of your job?			
yes	66.2 (47)	70.7 (29)	80.0 (24)
no	33.8 (24)	29.3 (12)	20.0 (6)

	Percent (Number) of Responses		
	Technical Monitor	Principal Investigator	Active Group
TABLE 8			
Q8. [If question 7 was yes:] Why didn't you mention it before?			
an understood, implicit part of the job	59.6 (28)	69.0 (20)	41.7 (10)
nature of work or job not conducive	17.0 (8)	20.7 (6)	12.5 (3)
small part of job, not top priority	12.8 (6)	6.9 (2)	16.7 (4)
forgot, should have mentioned	8.5 (4)	6.9 (2)	16.7 (4)
technology transfer an extra curricular, off-hours activity	2.1 (1)	—	8.3 (2)
management doesn't foster the activity	—	—	4.2 (1)
other	2.1 (1)	—	—
TABLE 9			
Q9. [If question 7 was no:] Why not?			
no opportunity, inapplicable due to nature of work	37.5 (9)	58.3 (7)	16.7 (1)
not in job description	37.5 (9)	41.7 (5)	66.7 (4)
technology transfer considered fallout from regular tasks	25.0 (6)	8.3 (1)	33.3 (2)
disseminate via inventions, publications, presentations	8.3 (2)	25.0 (3)	--
TABLE 10			
10. How familiar are you with technology transfer activities?			
quite	25.0 (18)	35.7 (15)	76.7 (23)
somewhat	48.6 (35)	52.4 (22)	23.3 (7)
little or no	26.4 (19)	11.9 (5)	--

	Percent (Number) of Responses		
	Technical Monitor	Principal Investigator	Active Group
TABLE 11			
Q11. What are your sources of information about technology transfer activities?			
Technology Utilization Office	33.3 (24)	45.2 (19)	75.0 (24)
Spinoff	29.2 (21)	26.2 (11)	25.0 (8)
NASA Tech Briefs	25.0 (18)	26.2 (11)	34.4 (11)
NASA Activities	19.4 (14)	14.3 (6)	--
personal involvement and experience	9.7 (7)	14.3 (6)	25.0 (8)
other outside publications, presentations, etc.	16.7 (12)	21.4 (9)	3.1 (1)
contract boilerplate	13.9 (10)	7.1 (3)	3.1 (1)
contact among peers	9.7 (7)	11.9 (5)	3.1 (1)
NASA inhouse information	8.3 (6)	19.0 (8)	--
Field Center newsletter	12.5 (9)	4.8 (2)	--
contractor, commercial feedback	5.6 (4)	9.5 (4)	--
patent process	1.4 (1)	7.1 (3)	6.3 (2)
other Technology Utilization Program components	1.4 (1)	4.8 (2)	9.4 (3)
common knowledge, word of mouth	4.2 (3)	4.8 (2)	--
NASA headquarters	1.4 (1)	2.4 (1)	6.3 (2)
Field Center chain of command	2.8 (2)	--	6.3 (2)
other	4.2 (3)	4.8 (2)	12.5 (4)

Percent (Number) of Responses

	Technical Monitor	Principal Investigator	Active Group
TABLE 12			
Q12. How adequate is the information reaching you about technology transfer activities?			
quite	33.8 (24)	50.0 (21)	56.3 (18)
somewhat	53.5 (38)	40.5 (17)	37.5 (12)
not at all	12.7 (9)	9.5 (4)	6.3 (2)
TABLE 13			
Q13. Why do you say that [in question 12]?			
knows enough, gets enough to solve problems	44.4 (32)	50.0 (21)	43.8 (14)
lack of knowledge or awareness	25.0 (18)	21.4 (9)	18.8 (6)
agency efforts outside of TUO to make people aware	16.7 (12)	11.9 (5)	21.9 (7)
could be better, used to be better	9.7 (7)	9.5 (4)	3.1 (1)
kept aware by Technology Utilization Office	4.2 (3)	4.8 (2)	15.6 (5)
a function of personal involvement and experience	4.2 (3)	2.4 (1)	9.4 (3)
lack of involvement or participation	5.6 (4)	2.4 (1)	—
limited resources, no time	1.4 (1)	4.8 (2)	—
other	—	2.4 (1)	3.1 (1)
attempt to restrict or limit dissemination outside of US	1.4 (1)	2.4 (1)	--

Percent (Number) of Responses

TABLE 14

Q12 x Q13. Adequacy of information about technology transfer crosstabulated with reasons for selecting that level of adequacy.

	Quite	Somewhat	Not at All
a function of personal involvement and experience	7.9 (5)	3.0 (2)	—
kept aware by Technology Utilization Office	7.9 (5)	7.5 (5)	—
agency efforts outside of TUO to make people aware	22.2 (14)	14.9 (10)	—
knows enough, gets enough to solve problems	71.4 (45)	32.8 (22)	—
lack of knowledge or awareness	—	34.3 (23)	66.7 (10)
limited resources, no time	—	3.0 (2)	6.7 (1)
could be better, used to be better	—	13.4 (9)	20.4 (3)
attempt to limit or restrict dissemination outside of US	—	1.5 (1)	6.7 (1)
lack of involvement or participation	—	6.0 (4)	13.3 (2)
other	—	1.5 (1)	6.7 (1)

TABLE 15

Q14. How much emphasis does NASA give to technology transfer?

	Technical Monitor	Principal Investigator	Active Group
great deal	60.9 (42)	60.0 (24)	48.4 (15)
some	34.8 (24)	32.5 (13)	38.7 (12)
little or no	4.3 (3)	7.5 (3)	12.9 (4)

TABLE 16

Q15. Why do you say that [in question 14]?

	Percent (Number) of Responses		
	Technical Monitor	Principal Investigator	Active Group
awareness, evidence of organized technology transfer effort	47.2 (34)	47.6 (20)	46.9 (15)
goal fits in with job	11.1 (8)	19.0 (8)	15.6 (5)
could be better, used to be better	12.5 (9)	2.4 (1)	21.9 (7)
not visible, little awareness of effort	5.6 (4)	9.5 (4)	15.6 (5)
management recognizes importance	8.3 (6)	11.9 (5)	6.3 (2)
need to make public aware of good NASA's doing	9.7 (7)	7.1 (3)	3.1 (1)
NASA monetary commitment	2.8 (2)	2.4 (1)	6.3 (2)
highly sensitive to international or outside dissemination	—	4.8 (2)	—
other	4.2 (3)	2.4 (1)	—
not part of agency's main mission	—	—	3.1 (1)
technology transfer is time consuming	—	—	3.1 (1)

Percent (Number) of Responses

TABLE 17

Q14 x Q15. Degree of emphasis given technology transfer by NASA crosstabulated with reasons for selecting that degree of emphasis.

	Great Deal	Some	Little or No
management recognizes importance	14.8 (12)	2.0 (1)	—
awareness, evidence of organized technology transfer effort	56.8 (46)	44.9 (22)	--
goal fits in with job	21.0 (17)	8.2 (4)	—
need to make public aware of good NASA's doing	11.1 (9)	4.1 (2)	--
NASA monetary commitment	6.2 (5)	—	--
not visible, little awareness of effort	1.2 (1)	12.2 (6)	60.0 (6)
could be better, used to be better	3.7 (3)	24.5 (12)	20.0 (2)
not part of agency's main mission	—	—	10.0 (1)
highly sensitive to international or outside dissemination	1.2 (1)	2.0 (1)	—
technology transfer is time consuming	—	2.0 (1)	--
other	1.2 (1)	4.1 (2)	10.0 (1)

TABLE 18

Q16. How much emphasis does your work unit give to technology transfer?

	Technical Monitor	Principal Investigator	Active Group
great deal	31.9 (23)	39.0 (16)	31.3 (10)
some	44.4 (32)	36.6 (15)	37.5 (12)
little or no	23.6 (17)	23.4 (10)	31.3 (10)

Percent (Number) of Responses

	Technical Monitor	Principal Investigator	Active Group
TABLE 19			
Q17. Why do you say that [in question 16]?			
nature of work	31.9 (23)	31.0 (13)	18.8 (6)
contribution solicited, encouraged, supported	16.7 (12)	16.7 (7)	28.1 (9)
aware of system, use system	15.3 (11)	14.3 (6)	21.9 (7)
compatible with work unit's overall responsibility	12.5 (9)	9.5 (4)	9.4 (3)
contribution not encouraged or supported	6.9 (5)	7.1 (3)	28.1 (9)
unaware of system, not visible	8.3 (6)	16.7 (7)	6.3 (2)
incompatible with work unit's overall responsibility	6.9 (5)	11.9 (5)	6.3 (2)
required activity, main goal	2.8 (2)	4.8 (2)	—
has encountered problems	1.4 (1)	4.8 (2)	—
could be better, used to be better, others better	—	2.4 (1)	3.1 (1)
Technology Utilization Office understaffed	1.4 (1)	—	—
personal experience, hearsay	1.4 (1)	—	—

Percent (Number) of Responses

TABLE 20

Q16 x Q17. Degree of emphasis given technology transfer by work unit crosstabulated with reasons for selecting that degree of emphasis.

	Great Deal	Some	Little or No
nature of work	16.3 (8)	30.5 (18)	43.2 (16)
contribution solicited, encouraged, supported	40.8 (20)	13.6 (8)	—
aware of system, use system	24.5 (12)	18.6 (11)	2.7 (1)
required activity, main goal	8.2 (4)	—	—
compatible with work unit's overall responsibility	18.4 (9)	11.9 (7)	—
incompatible with work unit's overall responsibility	2.0 (1)	13.6 (8)	8.1 (3)
contribution not encouraged or supported	—	10.2 (6)	29.7 (11)
unaware of system, not visible	—	8.5 (5)	27.0 (10)
Technology Utilization Office understaffed	—	1.7 (1)	—
could be better, used to be better	2.0 (1)	1.7 (1)	—
personal experience, hearsay	2.0 (1)	—	—
has encountered problems	2.0 (1)	3.4 (2)	—

	Percent (Number) of Responses		
	Technical Monitor	Principal Investigator	Active Group
TABLE 21			
Q18. How does NASA benefit from its technology transfer activities?			
positive public and political image	77.8 (56)	61.9 (26)	87.5 (28)
allows mutually beneficial interchange, two-way street	15.3 (11)	38.1 (16)	18.8 (6)
NASA projects work better	13.9 (10)	11.9 (5)	9.4 (3)
less duplication of effort	2.8 (2)	9.5 (4)	3.1 (1)
provides a systematic way of realizing technology transfer goal	4.2 (3)	7.1 (3)	—
NASA doesn't benefit	2.8 (2)	4.8 (2)	3.1 (1)
motivated, satisfied employees	1.4 (1)	4.8 (2)	3.1 (1)
other	1.4 (1)	—	—
TABLE 22			
Q19. How does NASA suffer if its technology transfer activities are not effective?			
lessened or negative public and political image	75.0 (54)	66.7 (28)	81.3 (26)
NASA underperforms	11.1 (8)	31.0 (13)	18.8 (6)
no outside input, isolated	12.5 (9)	28.6 (12)	9.4 (3)
duplication of effort	8.3 (6)	—	—
no spinoff, no transfer	—	2.4 (1)	3.1 (1)
doesn't suffer	1.4 (1)	—	—

Percent (Number) of Responses

TABLE 23

Q20. What would motivate you to take a very active role in technology transfer activities?	Technical Monitor	Principal Investigator	Active Group
personal satisfaction	23.6 (17)	26.2 (11)	37.5 (12)
award, recognition, credit	20.8 (15)	26.2 (11)	28.1 (9)
part of the job, requirement	15.3 (11)	7.1 (3)	12.5 (4)
personal interest, excitement	5.6 (4)	14.3 (6)	9.4 (3)
to stay sharp and in forefront technically	9.7 (7)	21.4 (9)	--
nothing	12.5 (9)	7.1 (3)	6.3 (2)
enhanced promotion possibilities	11.1 (8)	4.8 (2)	6.3 (2)
managerial recognition of importance of the function	6.9 (5)	7.1 (3)	9.4 (3)
time available, less red tape	6.9 (5)	7.1 (3)	9.4 (3)
work yields something to contribute	9.7 (7)	2.4 (1)	9.4 (3)
strengthen Technology Utilization Program	6.9 (5)	—	9.4 (3)
resources available	5.6 (4)	4.8 (2)	6.3 (2)
obligation to repay taxpayer	1.4 (1)	7.1 (3)	9.4 (3)
to help own/others' research programs	2.8 (2)	2.4 (1)	—
if technology transfer only way technology will get used	—	—	3.1 (1)
if NASA needed or would benefit from this activity	1.4 (1)	—	--

Percent (Number) of Responses

TABLE 24

	Technical Monitor	Principal Investigator	Active Group
Q21. What would prevent you from taking a very active role in technology transfer activities?			
time unavailable	44.4 (32)	38.1 (16)	43.8 (14)
lack of management support	20.8 (15)	21.4 (9)	25.0 (8)
lack of incentive, personal interest	12.5 (9)	16.7 (7)	21.9 (7)
nothing	13.9 (10)	16.7 (7)	18.8 (6)
barriers to free exchange and communication	11.1 (8)	11.9 (5)	3.1 (1)
resources unavailable	6.9 (5)	14.3 (6)	3.1 (1)
lack of awareness, knowledge	1.4 (1)	2.4 (1)	9.4 (3)
unsuitable nature of work	4.2 (3)	9.5 (4)	--
participation has negative consequences	1.4 (1)	--	6.3 (2)
having another channel to report through	--	--	3.1 (1)

TABLE 25

Q22. How much pressure does NASA use to promote technology transfer activities?			
too much	2.9 (2)	2.4 (1)	--
too little	24.6 (17)	12.5 (5)	37.5 (12)
just about right	72.5 (50)	85.4 (35)	62.5 (20)

	Percent (Number) of Responses		
	Technical Monitor	Principal Investigator	Active Group
TABLE 26			
Q24. Have you been involved in any technology applications projects?			
yes	20.8 (15)	19.0 (8)	62.5 (20)
no	79.2 (57)	81.0 (34)	37.5 (12)
TABLE 27			
Q25. [If question 24 was yes:] How often?			
1 time	53.3 (8)	42.9 (3)	26.3 (5)
2	26.7 (4)	14.3 (1)	31.6 (6)
3 or more	—	—	21.2 (4)
many, several, some, a few, etc.	20.0 (3)	42.9 (3)	21.1 (4)
TABLE 28			
Q26. [If question 24 was yes:] Under what circumstances?			
part of the job, responsibility	33.3 (5)	50.0 (4)	40.0 (8)
due to expertise	46.7 (7)	12.5 (1)	35.0 (7)
personal interest	6.7 (1)	25.0 (2)	15.0 (3)
contact with colleagues	6.7 (1)	25.0 (2)	15.0 (3)
nature of work	6.7 (1)	12.5 (1)	—
other	6.7 (1)	—	10.0 (2)
time available	6.7 (1)	—	—
encouraged to be aware of spinoff possibilities	—	—	5.0 (1)

Percent (Number) of Responses

	Technical Monitor	Principal Investigator	Active Group
TABLE 29			
Q27. Have you consulted or handled inquiries from outside NASA that involved technology transfer?			
yes	73.6 (53)	71.4 (30)	93.8 (30)
no	26.4 (19)	28.6 (12)	6.2 (2)
TABLE 30			
Q28. [If question 27 was yes:] How many times a year?			
1-5 times	39.6 (21)	40.0 (12)	16.7 (5)
6-10	5.7 (3)	10.0 (3)	16.7 (5)
11-20	11.3 (6)	10.0 (3)	13.3 (4)
21 or more	9.5 (5)	20.1 (6)	26.7 (8)
many, several, some, a few, etc.	28.3 (15)	20.0 (6)	26.7 (8)
TABLE 31			
Q29. [If question 27 was yes:] Under what circumstances?			
expertise	75.5 (40)	83.3 (25)	86.7 (26)
part of the job, responsibility	18.9 (10)	6.7 (2)	20.0 (6)
contact with colleagues	13.2 (7)	13.3 (4)	6.7 (2)
nature of work	3.8 (2)	3.3 (1)	10.0 (3)
other	1.9 (1)	6.7 (2)	—
activity is valuable and useful	—	—	3.3 (1)

	Percent (Number) of Responses		
personal interest	—	—	3.3 (1)
	Technical Monitor	Principal Investigator	Active Group

TABLE 32

Q30. [If question 27 was yes:] How did you personally benefit?

personal satisfaction	50.9 (27)	36.7 (11)	63.3 (19)
professional satisfaction	17.0 (9)	23.3 (7)	33.3 (10)
recognition, reward	13.2 (7)	20.0 (6)	26.7 (8)
none, minimal	24.5 (13)	20.0 (6)	13.3 (4)
job promotion, raise	7.5 (4)	—	3.3 (1)
become familiar with applications problems	1.9 (1)	6.7 (2)	—

TABLE 33

Q31. How would you evaluate NASA's technology transfer effort?

excellent	19.7 (14)	19.0 (8)	30.0 (9)
good	57.7 (41)	64.3 (27)	46.7 (14)
fair	15.5 (11)	16.7 (7)	13.3 (4)
poor	7.0 (5)	—	6.7 (2)
very poor	—	—	3.3 (1)

	Percent (Number) of Responses		
	Technical Monitor	Principal Investigator	Active Group
TABLE 34			
Q32. Why do you say that [in question 31]?			
visible program	30.6 (22)	31.0 (13)	15.6 (5)
system in place, emphasized by NASA	20.8 (15)	33.3 (14)	28.1 (9)
could be better, used to be better	25.0 (18)	16.7 (7)	12.5 (4)
fulfills its purpose, it works	13.9 (10)	11.9 (5)	25.0 (8)
lack of visibility, awareness, relevance	12.5 (9)	7.1 (3)	3.1 (1)
not backed or emphasized within NASA	2.8 (2)	4.8 (2)	12.5 (4)
not a good system, doesn't work	4.2 (3)	4.8 (2)	9.4 (3)
other	1.4 (1)	4.8 (2)	3.1 (1)
variables outside control of NASA prevent higher rating	1.4 (1)	4.8 (2)	--
adequate	1.4 (1)	--	--

Percent (Number) of Responses

TABLE 35

Q31 x Q32. Evaluation of NASA's technology transfer effort crosstabulated with reasons for given evaluation.

	Excellent	Good	Fair	Poor	Very Poor
system in place, emphasized by NASA	41.9 (13)	29.3 (24)	9.1 (2)	—	—
fulfills its purpose, it works	25.8 (8)	15.9 (13)	9.1 (2)	—	—
visible program	41.9 (13)	31.7 (26)	4.5 (1)	—	—
variables outside control of NASA prevent higher rating	—	2.4 (2)	4.5 (1)	—	—
not backed or emphasized within NASA	—	3.7 (3)	18.2 (4)	14.3 (1)	—
not a good system, doesn't work	—	3.7 (3)	13.6 (3)	14.3 (1)	100.0 (1)
lack of visibility, awareness, relevance	3.2 (1)	2.4 (2)	31.8 (7)	42.9 (3)	—
adequate	—	1.2 (1)	—	—	—
could be better, used to be better	—	24.4 (20)	27.3 (6)	28.6 (2)	—
other	—	4.9 (4)	—	—	—

TABLE 36

Q33. [Referring to Card 2:] Has this or a similar statement (about NASA's New Technology Reporting system) ever been brought to your attention?

	Technical Monitor	Principal Investigator	Active Group
yes	72.2 (52)	78.6 (33)	68.8 (22)
no	27.8 (20)	21.4 (9)	31.2 (10)

TABLE 37

	Percent (Number) of Responses		
	Technical Monitor	Principal Investigator	Active Group
Q34. [If question 33 was yes:] How?			
contract boilerplate	51.9 (27)	36.4 (12)	36.4 (8)
Technology Utilization Office	17.3 (9)	21.2 (7)	13.6 (3)
patent process	5.8 (3)	9.1 (3)	22.7 (5)
NASA inhouse information	3.8 (2)	12.1 (4)	18.2 (4)
NASA headquarters	5.8 (3)	6.1 (2)	9.1 (2)
Field Center chain of command	5.8 (3)	9.1 (3)	—
other	1.9 (1)	3.0 (1)	9.1 (2)
other outside publications, presentations, etc.	—	9.1 (3)	—
NASA Tech Briefs	—	6.1 (2)	4.5 (1)
procurement	1.9 (1)	3.0 (1)	4.5 (1)
Space Act charter	1.9 (1)	—	4.5 (1)
Field Center newsletter	1.9 (1)	3.0 (1)	—
NASA Activities	3.8 (2)	—	—
division technology transfer agent	—	—	4.5 (1)
other Technology Utilization Program components	—	—	4.5 (1)
inherent to work	—	3.0 (1)	—

	Percent (Number) of Responses		
	Technical Monitor	Principal Investigator	Active Group
TABLE 38			
Q35. Are you aware of any other sources of information about the New Technology Reporting system?			
yes	31.9 (23)	38.1 (16)	46.9 (15)
no	68.1 (49)	61.9 (26)	53.1 (17)
TABLE 39			
Q36. [If question 35 was yes:] What are they?			
Technology Utilization Office	21.7 (5)	31.3 (5)	13.3 (2)
contract boilerplate	26.1 (6)	6.3 (1)	13.3 (2)
NASA headquarters	13.0 (3)	25.0 (4)	6.7 (1)
Field Center chain of command	17.4 (4)	12.5 (2)	6.7 (1)
NASA Activities	4.3 (1)	12.5 (2)	20.0 (3)
NASA Tech Briefs	13.0 (3)	—	20.0 (3)
NASA inhouse information	13.0 (3)	—	—
patent process	8.7 (2)	6.3 (1)	—
Spinoff	4.3 (1)	—	6.7 (1)
Field Center newsletter	—	—	6.7 (1)
common knowledge, word of mouth	—	—	6.7 (1)
personal involvement and experience	—	—	6.7 (1)
other	8.7 (2)	12.5 (2)	6.7 (1)

Percent (Number) of Responses

	Technical Monitor	Principal Investigator	Active Group
TABLE 40			
Q37. How adequate is the information reaching you about the New Technology Reporting system?			
quite	23.6 (17)	31.7 (13)	37.5 (12)
somewhat	51.4 (37)	48.8 (20)	37.5 (12)
not at all	25.0 (18)	19.5 (8)	25.0 (8)
TABLE 41			
Q38. Why do you say that [in question 37]?			
lack of knowledge or awareness	44.4 (32)	35.7 (15)	37.5 (12)
knows enough, gets enough to solve problems	32.0 (23)	33.3 (14)	34.4 (11)
agency efforts outside of TUO to make people aware	15.3 (11)	26.2 (11)	25.0 (8)
kept aware by Technology Utilization Office	4.2 (3)	7.1 (3)	3.1 (1)
a function of personal involvement and experience	1.4 (1)	—	6.2 (2)
lack of involvement or participation	1.4 (1)	4.8 (2)	—
could be better, used to be better	1.4 (1)	2.4 (1)	—

Percent (Number) of Responses

TABLE 42

Q37 x Q38. Adequacy of information about New Technology Reporting system crosstabulated with reasons for selecting that level of adequacy.

	Quite	Somewhat	Not at All
a function of personal involvement and experience	2.4 (1)	2.9 (2)	—
kept aware by Technology Utilization Office	11.9 (5)	2.9 (2)	—
agency efforts outside of TUO to make people aware	35.7 (15)	21.7 (15)	—
knows enough, gets enough to solve problems	54.8 (23)	36.2 (25)	—
lack of knowledge or awareness	2.4 (1)	34.8 (24)	97.1 (33)
could be better, used to be better	—	2.9 (2)	—
lack of involvement or participation	2.4 (1)	2.9 (2)	2.9 (1)

TABLE 43

Q39. [Referring to Card 3:] Does this representation agree with your understanding of the New Technology Reporting system?

	Technical Monitor	Principal Investigator	Active Group
yes	93.0 (67)	75.6 (31)	90.6 (29)
no	6.9 (5)	24.4 (10)	9.4 (3)

	Percent (Number) of Responses		
	Technical Monitor	Principal Investigator	Active Group
TABLE 44			
Q41. What do you see as your role in the New Technology Reporting system?			
invent, innovate, report, submit	40.3 (29)	42.9 (18)	40.6 (13)
monitor contract	45.8 (33)	28.6 (12)	25.0 (8)
encourage, maintain awareness	11.1 (8)	19.0 (8)	40.6 (13)
oversee inhouse work	8.3 (6)	9.5 (4)	12.5 (4)
identify, evaluate new technology	11.1 (8)	7.1 (3)	3.1 (1)
interface with various other participants	4.2 (3)	4.8 (2)	9.4 (3)
none	5.6 (4)	7.1 (3)	—
fill out forms and paperwork	1.4 (1)	4.8 (2)	—
disseminate technology	1.4 (1)	—	—
TABLE 45			
Q42. Is your New Technology Reporting role different, depending on whether the work is done inhouse or under contract?			
yes	40.3 (29)	27.5 (11)	53.1 (17)
no	36.1 (26)	52.5 (21)	37.5 (12)
do only inhouse	1.4 (1)	15.0 (6)	3.1 (3)
do only contract	22.2 (16)	5.0 (2)	—

	Percent (Number) of Responses		
	Technical Monitor	Principal Investigator	Active Group
TABLE 46			
Q43. [If question 42 was yes:] How is it different?			
own innovation inhouse vs. overseeing contractor's	44.8 (13)	18.2 (2)	35.3 (6)
other	10.3 (3)	54.5 (6)	23.5 (4)
working with contractors presents problems	27.6 (8)	—	23.5 (4)
contractor procedure systematized as opposed to inhouse free flow	17.2 (5)	18.2 (2)	5.9 (1)
contractor not doing innovative work	—	9.1 (1)	11.8 (2)
TABLE 47			
Q44. Why would a person with your responsibilities take a very active role in the New Technology Reporting system?			
part of job responsibility	43.0 (31)	35.7 (15)	43.7 (14)
to see technology reported, used	29.2 (21)	26.2 (11)	25.0 (8)
recognition, awards, career development	38.1 (16)	26.2 (11)	25.0 (8)
personal satisfaction	7.0 (5)	12.5 (4)	43.7 (14)
to support work being pursued	16.7 (7)	12.5 (4)	3.1 (1)
wouldn't be more active	2.8 (2)	12.5 (4)	—
couldn't be more active	4.2 (3)	—	3.1 (1)
other	2.8 (2)	—	3.1 (1)

	Percent (Number) of Responses		
	Technical Monitor	Principal Investigator	Active Group
TABLE 48			
Q45. Do you get involved in the New Technology Reporting system with any of the following people?			
innovator/inventor	81.9 (59)	70.7 (29)	96.9 (31)
contractor's new technology representative	30.5 (22)	21.9 (9)	38.7 (12)
Field Center's New Technology Reporting officer	52.8 (38)	48.8 (20)	80.6 (25)
new technology reporting evaluators	18.0 (13)	17.1 (7)	38.7 (12)
TABLE 49			
Q46. Have you encouraged or promoted reporting inventions through the New Technology Reporting system?			
yes	70.8 (51)	52.4 (22)	87.5 (28)
no	29.2 (21)	47.6 (20)	12.5 (4)
TABLE 50			
Q48. Have you recommended that an invention be considered for publication in NASA Tech Briefs?			
yes	43.7 (31)	40.5 (17)	71.9 (23)
no	56.3 (40)	59.5 (25)	28.1 (1)
TABLE 51			
Q49. [If question 48 was yes:] How many?			
1-5 recommendations	56.7 (17)	74.8 (12)	18.2 (4)
6-10	13.3 (4)	6.2 (1)	9.1 (2)
11 or more	13.3 (4)	—	27.3 (6)
many, several, some, a few, etc.	16.7 (5)	18.7 (3)	45.4 (10)

Percent (Number) of Responses

	Technical Monitor	Principal Investigator	Active Group
TABLE 52			
Q51. How many [of those included in question 49] were actually published in NASA Tech Briefs?			
none	3.6 (1)	—	4.8 (1)
1-5 published	67.8 (19)	61.5 (8)	19.1 (4)
6-10	7.2 (2)	7.6 (1)	9.5 (2)
11 or more	—	15.4 (2)	9.5 (2)
many, several, some, a few, etc.	21.4 (6)	15.4 (2)	57.1 (12)
TABLE 53			
Q52. How much emphasis does NASA give to the New Technology Reporting system?			
great deal	40.0 (28)	35.1 (13)	37.5 (12)
some	42.9 (30)	43.2 (16)	34.3 (11)
little or no	17.1 (12)	21.7 (8)	28.1 (9)

TABLE 54

Q53. Why do you say that [in question 52]?

	Percent (Number) of Responses		
	Technical Monitor	Principal Investigator	Active Group
awareness, evidence of organized effort	41.7 (30)	33.3 (14)	37.5 (12)
not visible, little awareness of effort	26.3 (19)	21.4 (9)	25.0 (8)
management recognizes importance	11.1 (8)	19.0 (8)	9.3 (3)
fits in with job	6.9 (5)	16.7 (7)	18.7 (6)
could be better, used to be better	4.1 (3)	2.3 (4)	6.2 (2)
NASA monetary commitment	4.1 (3)	2.4 (1)	9.4 (3)
need to make public aware of good NASA's doing	4.1 (3)	2.4 (1)	6.2 (2)
activity is time consuming	1.4 (1)	—	6.2 (2)
not part of agency's main mission	1.4 (1)	2.3 (1)	—

Percent (Number) of Responses

TABLE 55

Q52 x Q53. Degree of emphasis given New Technology Reporting by NASA crosstabulated with reasons for selecting that degree of emphasis.

	Great Deal	Some	Little or No
management recognizes importance	26.4 (14)	8.8 (5)	—
awareness, evidence of organized effort	58.5 (31)	43.9 (25)	—
goal fits in with job	20.8 (11)	12.3 (7)	—
need to make public aware of good NASA's doing	11.3 (6)	—	—
NASA monetary commitment	11.3 (6)	1.8 (1)	—
not visible, little awareness of effort	—	19.3 (11)	96.0 (24)
could be better, used to be better	1.9 (1)	14.0 (8)	—
not part of agency's main mission	—	1.8 (1)	4.0 (1)
activity is time consuming	—	5.3 (3)	—

TABLE 56

Q54. How much emphasis does your work unit give to the New Technology Reporting system?

	Technical Monitor	Principal Investigator	Active Group
great deal	19.4 (14)	16.7 (7)	28.1 (9)
some	51.4 (37)	42.8 (18)	34.3 (11)
little or no	29.1 (21)	40.4 (17)	37.5 (12)

TABLE 57

Q55. [Referring to response to question 54:] Why do you say that?

	Percent (Number) of Responses		
	Technical Monitor	Principal Investigator	Active Group
unaware of system, not visible	20.8 (15)	38.0 (16)	18.7 (6)
aware of system, use system	20.8 (15)	21.4 (9)	28.1 (9)
contribution solicited, encouraged, supported	18.0 (13)	26.2 (11)	15.6 (5)
contribution not encouraged or supported	12.5 (9)	2.4 (1)	21.9 (7)
nature of work	18.0 (13)	11.9 (5)	6.2 (2)
incompatible with work unit's overall responsibility	9.7 (7)	7.1 (3)	3.1 (1)
required activity, main goal	5.5 (4)	7.1 (3)	3.1 (1)
compatible with work unit's overall responsibility	4.1 (3)	2.4 (1)	3.1 (1)
personal experience, hearsay	4.1 (3)	—	6.2 (2)
could be better, used to be better	2.8 (2)	4.8 (2)	—
has encountered problems	1.4 (1)	—	3.1 (1)
other	1.4 (1)	—	3.1 (1)

Percent (Number) of Responses

TABLE 58

Q54 x Q55. Degree of emphasis given New Technology Reporting system by work unit crosstabulated with reasons for selecting that degree of emphasis.

	Great Deal	Some	Little or No
nature of work	13.3 (4)	16.7 (11)	10.0 (5)
contribution solicited, encouraged, supported	56.7 (17)	18.2 (12)	—
aware of system, use system	50.0 (15)	21.2 (14)	8.0 (4)
required activity, main goal	13.3 (4)	6.1 (4)	—
compatible with work unit's overall responsibility	3.3 (1)	3.0 (2)	4.0 (2)
incompatible with work unit's overall responsibility	—	10.6 (7)	8.0 (4)
contribution not encouraged or supported	—	13.6 (9)	16.0 (8)
unaware of system, not visible	—	13.6 (9)	56.0 (28)
could be better, used to be better	—	6.1 (4)	—
personal experience, hearsay	3.3 (1)	3.0 (2)	4.0 (2)
has encountered problems	—	3.0 (2)	—
other	—	3.0 (2)	—

	Percent (Number) of Responses		
	Technical Monitor	Principal Investigator	Active Group
TABLE 59			
Q56. How much pressure does NASA use to promote the New Technology Reporting system?			
too much	—	2.7 (1)	--
too little	22.5 (16)	16.2 (6)	35.5 (11)
just about right	77.5 (55)	81.1 (30)	64.5 (20)
TABLE 60			
Q57. With which of the following awards are you familiar?			
NASA Tech Briefs awards	80.5 (58)	80.9 (34)	96.9 (31)
NASA patent awards	81.9 (59)	83.3 (35)	84.4 (27)
NASA scientific/technical contribution awards	75.0 (54)	64.3 (27)	81.2 (26)
other awards	8.3 (6)	19.0 (8)	15.6 (5)
company sponsored awards	8.3 (6)	14.3 (6)	18.7 (6)
TABLE 61			
Q58. For which of the following awards do you personally know a winner?			
NASA patent awards	59.7 (43)	71.4 (30)	84.4 (27)
NASA Tech Briefs awards	54.2 (39)	61.9 (26)	93.7 (30)
NASA scientific/technical contribution awards	51.4 (37)	42.8 (18)	62.5 (20)
other awards	6.9 (5)	19.0 (8)	12.5 (4)
company sponsored awards	1.4 (1)	7.1 (3)	6.2 (2)

Percent (Number) of Responses

TABLE 62

	Technical Monitor	Principal Investigator	Active Group
Q59. Are there any aspects of these awards that could prevent them from being effective as motivators?			
none	50.0 (36)	50.0 (21)	46.9 (15)
award amount too small	15.3 (11)	9.5 (4)	37.5 (12)
award process faulty, lacking	19.4 (14)	9.5 (4)	9.4 (3)
lack of visibility and awareness that they exist	4.2 (3)	9.5 (4)	6.2 (2)
award has to represent gain in reputation, recognition	5.5 (4)	4.8 (2)	6.2 (2)
involves red tape, extra work	4.2 (3)	7.1 (3)	3.1 (1)
lack of timeliness	—	7.1 (3)	9.4 (3)
other	2.8 (2)	2.4 (1)	3.1 (1)
need more management support and supervisor encouragement	2.8 (2)	—	—
competitiveness	—	2.4 (1)	—
number of awards too small	1.4 (1)	—	—

TABLE 63

	Percent (Number) of Responses		
	Technical Monitor	Principal Investigator	Active Group
Q60. What would most encourage you to take a very active role in the New Technology Reporting system?			
award, recognition, credit	18.0 (13)	26.2 (11)	25.0 (8)
nothing	15.3 (11)	16.7 (7)	31.2 (10)
part of the job, requirement	20.8 (15)	16.7 (7)	15.6 (5)
work yields something to contribute	19.4 (14)	14.3 (6)	—
strengthen Technology Utilization Program	15.3 (11)	11.9 (5)	9.4 (3)
time available, less red tape	9.7 (7)	9.5 (4)	18.7 (6)
managerial recognition of importance of the function	5.5 (4)	7.1 (3)	6.2 (2)
resources available	6.9 (5)	2.4 (1)	6.2 (2)
personal satisfaction	4.2 (3)	12.0 (5)	—
other	1.4 (1)	4.8 (2)	3.1 (1)
to stay sharp and in forefront technically	2.8 (2)	—	3.1 (1)
personal interest, excitement	2.8 (2)	—	—
enhanced promotion possiblities	—	2.4 (1)	—
if it's only way technology will get used	—	2.4 (1)	—

TABLE 64

Q61. What would prevent you from taking a very active role in the New Technology Reporting system?	Percent (Number) of Responses: Technical Monitor	Principal Investigator	Active Group
time unavailable	38.9 (28)	54.8 (23)	37.5 (12)
nothing	33.3 (24)	26.2 (11)	12.5 (4)
lack of management support	16.7 (12)	12.5 (4)	43.7 (14)
lack of incentive, personal interest	1.3 (7)	4.8 (2)	9.4 (3)
barriers to free exchange and communication	1.4 (1)	4.8 (2)	—
lack of awareness, knowledge	2.8 (2)	2.4 (1)	—
resources unavailable	—	2.4 (1)	3.1 (1)
having another channel to report through	1.4 (1)	2.4 (1)	—
other	1.4 (1)	—	3.1 (1)
participation has negative consequences	—	—	3.1 (1)
unsuitable nature of work	2.8 (2)	—	—

	Percent (Number) of Responses		
	Technical Monitor	Principal Investigator	Active Group
TABLE 65			
Q62. How does NASA benefit from the New Technology Reporting system?			
positive public and political image	61.1 (44)	59.5 (25)	71.9 (23)
provides a systematic way of realizing technology transfer goal	9.7 (7)	14.3 (6)	21.9 (7)
allows mutually beneficial interchange, two-way street	11.1 (8)	14.3 (6)	6.2 (2)
NASA projects work better	11.1 (8)	9.5 (4)	12.5 (4)
motivated, satisfied employees	5.5 (4)	2.4 (1)	9.4 (3)
less duplication of effort	8.3 (6)	2.4 (1)	3.1 (1)
NASA doesn't benefit	5.5 (4)	2.4 (1)	--
other	4.2 (3)	--	--
TABLE 66			
Q63. How does NASA suffer if its New Technology Reporting system is not effective?			
lessened or negative public and political image	59.7 (43)	59.5 (25)	78.1 (25)
NASA underperforms	16.7 (12)	2.4 (7)	15.6 (5)
no outside input, isolated	15.3 (11)	14.3 (6)	6.2 (2)
no spinoff, no transfer	8.3 (6)	7.1 (3)	12.5 (4)
duplication of effort	11.1 (8)	4.8 (2)	6.2 (2)
unable to attract new employees or motivate old ones	5.5 (4)	2.4 (1)	3.1 (1)
NASA doesn't suffer	2.8 (2)	4.8 (2)	--
other	2.8 (2)	--	3.1 (1)

Percent (Number) of Responses

TABLE 67

	Technical Monitor	Principal Investigator	Active Group
Q64. What element or portion of the New Technology Reporting system works best?			
entire system	13.6 (3)	28.6 (6)	5.9 (1)
inhouse procedures and participants	13.6 (3)	14.3 (3)	17.6 (3)
New Technology Reporting officer	13.6 (3)	4.8 (1)	17.6 (3)
office/division head, division technology transfer agent	13.6 (3)	9.5 (2)	5.9 (1)
none, nothing comes to mind	9.1 (2)	14.3 (3)	5.9 (1)
other (e.g., patent system, Spinoff)	4.5 (1)	4.8 (1)	17.6 (3)
both contractor and inhouse innovator/inventor	13.6 (3)	—	—
contractor procedures and participants	9.1 (2)	4.8 (1)	—
inhouse link from innovator to TUO	—	—	11.8 (2)
New Technology Reporting evaluators	9.1 (2)	—	—
NASA Tech Briefs	—	—	5.9 (1)
New Technology Reporting officer and evaluators	—	—	5.9 (1)
entire system except New Technology Reporting evaluators	—	—	5.9 (1)
awards for publication in NASA Tech Briefs	—	4.8 (1)	—
system once submittal gets to New Technology Reporting officer	—	4.8 (1)	—
overseer of both own and inhouse R&D	—	4.8 (1)	—
innovator/inventor and New Technology Reporting officer	—	4.8 (1)	—

TABLE 68

	Percent (Number) of Responses		
	Technical Monitor	Principal Investigator	Active Group
Q66. What element or portion of the New Technology Reporting system most needs strengthening?			
nothing	17.9 (7)	42.1 (8)	14.3 (3)
New Technology Reporting evaluators	17.9 (7)	5.3 (1)	19.0 (4)
contractor procedures and participants	10.2 (4)	5.3 (1)	23.8 (5)
other	12.8 (5)	5.3 (1)	9.5 (2)
entire system	7.7 (3)	—	9.5 (2)
office/division head, division technology transfer agent	7.7 (3)	5.3 (1)	4.8 (1)
inhouse procedures and participants	7.7 (3)	10.5 (2)	--
NASA Tech Briefs	—	5.3 (1)	4.8 (1)
overseer of contractor and inhouse R&D	—	5.3 (1)	4.8 (1)
contractor and inhouse new technology representatives	2.6 (1)	5.3 (1)	--
system once submittal gets to New Technology Reporting officer	2.6 (1)	5.3 (1)	—
awards for publication in NASA Tech Briefs	2.6 (1)	5.3 (1)	—
New Technology Reporting officer	2.6 (1)	—	4.8 (1)
initiators of new technology and its entry into the system	—	—	4.8 (1)
inhouse innovator/inventor	2.6 (1)	—	--
contract technical monitor	2.6 (1)	—	--
contractor and inhouse New Technology Reporting agents and officer	2.6 (1)	--	—

	Percent (Number) of Responses		
	Technical Monitor	Principal Investigator	Active Group
TABLE 69			
Q68. How would you evaluate NASA's New Technology Reporting system?			
excellent	10.4 (7)	10.8 (4)	24.1 (7)
good	65.7 (44)	65.6 (25)	51.7 (15)
fair	20.9 (14)	21.6 (8)	20.7 (6)
poor	1.5 (1)	—	3.4 (1)
very poor	1.5 (1)	—	—
TABLE 70			
Q69. Why do you say that [in question 68]?			
system in place, emphasized by NASA	26.4 (19)	35.7 (15)	28.1 (9)
fulfills its purpose, it works	26.4 (19)	30.9 (13)	12.5 (4)
visible program	22.2 (16)	9.5 (4)	12.5 (4)
could be better, used to be better	11.1 (8)	16.7 (7)	18.7 (6)
lack of visibility, awareness, relevance	11.1 (8)	11.9 (5)	6.2 (2)
not backed or emphasized within NASA	6.9 (5)	7.1 (3)	6.2 (2)
not a good system, doesn't work	4.2 (3)	—	12.5 (4)
adequate	2.8 (2)	—	—
other	1.4 (1)	2.4 (1)	—
variables outside control of NASA prevent higher rating	—	2.4 (1)	—

Percent (Number) of Responses

TABLE 71

Q68 x Q69. Evaluation of NASA's New Technology Reporting system crosstabulated with reasons for given evaluation.

	Excellent	Good	Fair	Poor	Very Poor
fulfills its purpose, it works	55.6 (10)	25.0 (21)	14.3 (4)	—	—
system in place, emphasized by NASA	22.2 (4)	40.5 (34)	17.9 (5)	—	—
visible program	27.8 (5)	22.6 (19)	—	—	—
could be better, used to be better	—	16.7 (14)	25.0 (7)	—	—
lack of visibility, awareness, relevance	—	7.1 (6)	25.0 (7)	—	—
not backed or emphasized within NASA	—	3.6 (3)	21.4 (6)	50.0 (1)	—
not a good system, doesn't work	—	3.6 (3)	7.1 (2)	50.0 (1)	100.0 (1)
variables outside control of NASA prevent higher rating	—	1.2 (1)	—	—	—
adequate	—	1.2 (1)	—	—	—
other	—	1.2 (1)	—	—	—

TABLE 72

	Percent (Number) of Responses		
	Technical Monitor	Principal Investigator	Active Group
Q70. How might nonparticipants be motivated to participate in the New Technology Reporting system?			
publicity and education to increase awareness	51.4 (37)	40.5 (17)	59.4 (19)
management emphasis, support, encouragement, directive	30.5 (22)	35.7 (15)	31.3 (10)
higher monetary award, recognition	18.0 (13)	33.3 (14)	46.9 (15)
make available time and resources	16.7 (12)	16.7 (7)	15.6 (5)
include in job description, performance appraisal	15.3 (11)	16.7 (7)	3.1 (1)
little or nothing	6.9 (5)	9.5 (4)	6.3 (2)
beef up Technology Utilization Program	4.2 (3)	4.8 (2)	9.4 (3)
other	4.2 (3)	2.4 (1)	6.3 (2)
lessen restrictions	—	2.4 (1)	—
provide feedback	—	2.4 (1)	—

TABLE 73

Major Points of Difference*: Technical Monitors vs. Principal Investigators

	TM	PI
Saliency		
Q1. Mentioned technical monitoring as an expected part of the job.	X	
Q2. Agreed when prompted that technical monitoring is part of job.	X	
Knowledge and Personal Involvement		
Q10. Quite familiar with technology transfer activities.		X
Q11. Source of information about technology transfer:		
Technology Utilization Office		X
Field Center newsletter	X	
contract boilerplate	X	
NASA inhouse information		X
Q12. Information on technology transfer activities quite adequate.		X
Q25. Involved in technology applications projects once or twice.	X	
Q28. Involved in consulting or handling outside inquiries more than 20 times a year.		X
Q38. Adequacy of information about New Technology Reporting due to agency efforts (excepting TUO) to keep system visible.		X
Q39. Card 3 accurately depicts New Technology Reporting system.	X	
Q41. Role in New Technology Reporting system to monitor contracts.	X	
Q42. Role differs depending on whether overseeing inhouse or contractor work.	X	
Q43. Difference in role is that contractors present more problems and barriers than inhouse projects.	X	
Q45. Involved most frequently in New Technology Reporting with:		
innovator/inventor	X	
contractor's new technology representative	X	
Q46. Encourage and promote use of New Technology Reporting system.	X	
Q49. Recommended an innovation be submitted to NASA Tech Briefs:		
1-5 times		X
more than 10 times	X	
Q51. Over 10 of those recommended published in NASA Tech Briefs.		X
Q57. Familiar with NASA scientific/technical contribution award.	X	
Q58. Personally know winners of NASA patent award.		X
Motivation		
Q5. Technical monitoring a primary task because:		
it involves a lot of work, time, and/or money	X	
it is important to the job at hand		X
Q9. Technology transfer not part of job because:		
the nature of the work presents no opportunity		X
it's considered natural fallout from regular duties	X	
information already disseminated through channels such as publications and presentations		X

*Tables 1-72 were examined for "differences." The percent responses were compared for Technical Monitors and Principal Investigators. A "difference" was noted if there was a spread of 10 points or more, or if one percent was two times or more than the other.

	TM	PI
Q18. NASA benefits from technology transfer because of:		
enhanced positive public and political image	X	
mutually beneficial interchange of information		X
Q19. NASA suffers from ineffective technology transfer because of:		
isolation and lack of outside input		X
loses creativity and expertise, so underperforms		X
Q20. Motivated to be active in technology transfer if:		
it means staying in forefront technically		X
the work is personally interesting and exciting		X
it's a required part of the job	X	
Q22. NASA puts too little pressure on its scientists and engineers to promote technology transfer.	X	
Q26. Involved in technology applications projects due to:		
area of expertise	X	
considered a job responsibility		X
personal interest		X
contact with colleagues		X
Q29. Consider consulting and handling outside inquiries a job responsibility.	X	
Q30. Found handling outside inquiries personally satisfying.	X	
Q44. Would be active in New Technology Reporting for the recognition, awards, and professional and career development.	X	
Q54. Work unit gives little or no emphasis to New Technology Reporting.		X
Q59. The awards process is too faulty to motivate anyone.	X	
Q61. Too little time and too much other work to do to actively participate in New Technology Reporting.		X
Q63. If New Technology Reporting is ineffective, NASA loses creativity and expertise, so underperforms.	X	
Q64. All elements of the New Technology Reporting system work well.		X
Q66. Element(s) of the New Technology Reporting system that need strengthening:		
none		X
evaluation by SRI and Technology Utilization Office	X	
Q70. Motivate participation in the New Technology Reporting system with:		
increased monetary award, recognition, appreciation		X
increased awareness and visibility	X	

TABLE 74

Major Points of Difference*: Active Group vs.
Both Technical Monitors and Principal Investigators

Saliency

Q1. Mentioned technology transfer as an expected part of job.
Q7. Agreed when prompted that technology transfer is part of job.

Knowledge and Personal Involvement

Q11. Source of information about technology transfer:
- Technology Utilization Office
- components of the Technology Utilization Program
- personal experience

Q24. Personally involved in technology applications projects.
Q25. Involved in 3 or more technology applications projects.
Q27. Personally involved in consulting or handling outside inquiries.
Q34. Became aware of New Technology Reporting through the patent process.
Q41. Role in New Technology Reporting system to encourage and maintain awareness in others.
Q45. Involved most frequently in New Technology Reporting with:
- innovator/inventor
- Field Center New Technology Reporting officer

Q46. Encourage and promote use of the New Technology Reporting system.
Q48. Recommend publication in NASA Tech Briefs.
Q49. Have recommended publication in NASA Tech Briefs over 10 times.
Q57. Familiar with NASA Tech Briefs award.
Q58. Personally knows winners of:
- NASA Tech Briefs awards
- NASA scientific/technical contribution awards
- NASA patent awards

Motivation

Q8. Forgot to mention technology transfer as part of job.
Q14. NASA gives little or no attention to technology transfer.
Q18. NASA benefits from technology transfer because of enhanced positive public and political image.
Q20. Motivated to be active in technology transfer if it yields personal satisfaction.
Q31. NASA's technology transfer activities rated excellent.
Q32. Rating of NASA's technology transfer activities based on fact that they are effective and fulfill their intended purpose.
Q44. Would be active in New Technology Reporting for the personal satisfaction and enjoyment.
Q56. NASA exerts too little pressure in its effort to promote the New Technology Reporting system.
Q59. Awards not effective motivators because award amount too small.

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*Tables 1-72 were examined for "differences." The percent responses were compared for the Active Group vs. the combined Technical Monitors and Principal Investigators. A "difference" was noted if there was a spread of 10 points or more in favor of the Active Group, or if the Active Group's percent was two times or more that of the rest of the sample.

Q60. Motivated to be active in New Technology Reporting if:
more time available and less red tape
nothing (already very active or no need to be active)

Q61. Lack of opportunity and management support would prevent active role in New Technology Reporting.

Q62. NASA benefits from New Technology Reporting because of:
having a systematic way of getting information out
enhanced positive public and political image

Q68. NASA's New Technology Reporting system rated excellent.

Q70. Motivate participation in the New Technology Reporting system with increased monetary award, recognition, and appreciation.

TABLE 75

Comparison of Responses to Same Questions Asked About Technology Transfer vs. New Technology Reporting (Raw Number of Responses for Entire Sample)

	TT	NTR
Sources of information about technology transfer activities (Q11)/ the New Technology Reporting system (Q34 and Q36).		
Technology Utilization Office	67	31
NASA Tech Briefs	40	9
Spinoff	40	2
contract boilerplate	14	56
NASA headquarters	4	15
How adequate is the information reaching you about technology transfer activities (Q12)/the New Technology Reporting system (Q37)?		
quite	63	42
not at all	15	34
Why do you say that in question 12 (Q13)/in question 37 (Q38)?		
knows enough, gets enough to solve problems	67	48
lack of knowledge or awareness	33	59
agency efforts outside of TUO to make people aware	24	30
How much emphasis does NASA give to technology transfer (Q14)/ the New Technology Reporting System (Q52)?		
great deal	81	53
little or no	10	29
Why do you say that in question 14 (Q15)/in question 52 (Q53)?		
awareness, evidence of organized effort	69	56
goal fits in with job	21	18
could be better, used to be better	17	36
management recognizes importance	13	19
How much emphasis does your work unit give to technology transfer (Q16)/the New Technology Reporting system (Q54)?		
great deal	49	30
little or no	37	50
Why do you say that in question 16 (Q17)/in question 54 (Q55)?		
nature of work	42	20
contribution solicited, encouraged, supported	28	29
aware of system, use system	24	33
unaware of system, not visible	15	37

	TT	NTR
How does NASA benefit from its technology transfer activities (Q18)/the New Technology Reporting system (Q62)?		
positive public and political image	110	92
allows mutually beneficial interchange, two-way street	33	16
provides a systematic way to realizing goal	6	20
How does NASA suffer if its technology transfer activities (Q19)/the New Technology Reporting system (Q63) is not effective?		
lessened or negative public and political image	108	93
NASA underperforms	27	24
no outside input, isolated	24	19
What would motivate you to take a very active role in technology transfer activities (Q20)/the New Technology Reporting system (Q60)?		
personal satisfaction	40	8
award, recognition, credit	35	32
part of the job, requirement	18	27
nothing	14	28
What would prevent you from taking a very active role in technology transfer activities (Q21)/the New Technology Reporting system (Q61)?		
time unavailable	62	63
lack of management support	32	30
nothing	23	39
lack of incentive, personal interest	23	12
How much pressure does NASA use to promote technology transfer activities (Q22)/the New Technology Reporting system (Q56)?		
too much	3	1
too little	34	33
just about right	105	105
How would you evaluate NASA's technology transfer effort (Q31)/ New Technology Reporting system (Q68)?		
excellent	31	18
good	82	84
fair	22	28
poor	7	2
very poor	1	1
(no answer	3	13)
Why do you say that in question 31 (Q32)/in question 68 (Q69)?		
visible program	40	24
system in place, emphasized by NASA	38	43
could be better, used to be better	29	21
fulfills its purpose, it works	23	36

NEW TECHNOLOGY REPORTING STUDY

Respondent Form

Name: _____

Position/Title: _____

[] Tech Monitor [] Principal Investigator

Location: [] Ames [] Langley

[] Goddard [] Lewis

[] Johnson [] Marshall

Organizational Unit: _____

Telephone: _____

Date of Interview: _____

Interview Length: _____ (Time began: _____)

(Time ended: _____)

Interviewer: _____

Good _____. I am _____ from the University of Denver Research Institute. We are conducting a survey for NASA among its personnel to determine how they perceive various aspects of their jobs. You have been selected randomly from among the personnel here at _____. Your answers to our questions will be confidential and anonymous.

1. First, please tell me the various tasks you are expected to do in your job?

[If technical monitoring of contracts not mentioned:]

2. Is the technical monitoring of contracts (that is, being the contracting officer representative) one of your present tasks?

[] Yes [Go to Q4.]

[] No [Ask:]

3. How does it happen that the technical monitoring of contracts is not presently a part of your job?

4. Of these various tasks that you are expected to do in your job, what do you consider the primary ones?

[If technical monitoring of contracts a primary task:]

5. Why do you include the technical monitoring of contracts as a primary task?

[If technical monitoring of contracts mentioned in Q1 or Q2 but not in Q4:]

6. Why didn't you include the technical monitoring of contracts as a primary task?

[PRESENT CARD 1: "This is a definition of technology transfer."]

[If technology transfer mentioned in Q1 or Q4, skip to Q10.]
[If technology transfer NOT mentioned in Q1 or Q4, continue.]

7. Do you consider technology transfer part of your job?

[] Yes [Ask:]

8. Why didn't you mention technology transfer as part of your job before?

[] No [Ask:]

9. Why don't you consider technology transfer part of your job?

10. Would you say that you are: [] QUITE FAMILIAR,
[] SOMEWHAT FAMILIAR, or have
[] LITTLE or NO FAMILIARITY
with technology transfer activities?

11. What are your sources of information about technology transfer activities?

12. Is the information reaching you about technology transfer activities: [] QUITE ADEQUATE,
[] SOMEWHAT ADEQUATE, or
[] NOT AT ALL ADEQUATE?

13. Why do you say that?

14. Taking NASA as a whole, does the agency give a:
[] GREAT DEAL OF EMPHASIS to technology transfer,
[] SOME EMPHASIS, or
[] LITTLE or NO EMPHASIS to it?

15. Why do you think that?

16. What about your particular work unit within (...FIELD CENTER NAME...)? Is a:
    [] GREAT DEAL OF EMPHASIS given to technology transfer,
    [] SOME EMPHASIS, or
    [] LITTLE or NO EMPHASIS?

17. Why do you say that?

18. Again thinking of NASA as a whole, how does the agency benefit from its technology transfer activities?

19. In NASA as a whole, how does the agency suffer if its technology transfer activities are not effective?

20. What motivations or personal benefits would make you, as a NASA scientist or engineer, take a very active role in technology transfer activities?

21. What would prevent you from taking a very active role in technology transfer activities?

22. Does NASA put:
    [] TOO MUCH PRESSURE, [Go to Q23.]
    [] TOO LITTLE PRESSURE, or [Go to Q23.]
    [] JUST ABOUT THE RIGHT AMOUNT OF PRESSURE [Go to Q24.]
    upon its scientists and engineers in its effort to promote technology transfer activities?

23. Why do you say there is (TOO MUCH)(TOO LITTLE) pressure?

24. Have you personally been involved in any technology applications projects with organizations outside of NASA?

[] Yes [Ask:]

25. How often have you been involved in technology applications projects with organizations outside of NASA?

26. What circumstances led you to become involved in these projects?

[] No

27. Have you personally been involved in consulting or receiving inquiries from outside of NASA that may involve technology transfer?

[] Yes [Ask:]

28. How many times does this happen in the course of a year?

29. What circumstances led you to become involved in consulting or receiving inquiries from outside of NASA?

30. What kinds of personal benefits did you receive from these technology transfer activities with organizations outside of NASA?

[] No

31. Thinking back over all of the matters we have discussed about NASA's technology transfer activities, how would you evaluate this effort:

[] EXCELLENT [] GOOD [] FAIR [] POOR [] VERY POOR

32. Why do you say that?

[PRESENT CARD 2]

33. This is the most recent NASA statement concerning the objectives of its New Technology Reporting system, a formalized procedure through which to report new technology. Has this or a similar statement ever been brought to your attention?

[] Yes [Ask:]
34. How was this brought to your attention?

[] No

35. Are there any other sources of information about the New Technology Reporting system that you are aware of?

[] Yes [Ask:]
36. What are they?

[] No

37. Is the information reaching you about the New Technology Reporting system: [] QUITE ADEQUATE,
[] SOMEWHAT ADEQUATE, or
[] NOT AT ALL ADEQUATE?

38. Why do you say that?

[PRESENT CARD 3]

39. This is a representation of the New Technology Reporting system from initiation through publication in Tech Briefs to awards. Does this agree with your understanding of the system?

[] Yes [Go to Q41.]

[] No [Ask:]
40. How is your understanding of the system different from what is represented here?

41. What do you see as being your role in the New Technology Reporting system?

42. Is your role different, depending upon whether you are overseeing in-house work or contract work?

[] Do only in-house / [] Do only contract [Go to Q44.]

[] Yes [Ask:]
43. How is it different?

[] No

44. Why would a person with your responsibilities take a very active role in the New Technology Reporting system?

45. Tell me whether you get involved in the New Technology Reporting system with each of the people I am going to mention:

[] INNOVATOR/INVENTOR
[] CONTRACTOR'S NEW TECHNOLOGY REPRESENTATIVE
[] FIELD CENTER'S NEW TECHNOLOGY REPORTING OFFICER
[] NEW TECHNOLOGY REPORTING EVALUATORS

46. Have you personally been involved with encouraging or promoting the reporting of innovations or inventions through the New Technology Reporting system?

[] Yes [Go to Q48.]

[] No [Ask:]
47. Why is that?

48. Have you personally been involved in the process of recommending that an innovation or invention be considered for publication in Tech Briefs?

[] Yes [Ask:]
49. How many such recommendations have you made?

50. What were the results of your recommendations?

51. How many were actually published in Tech Briefs?

[] No

52. Again taking NASA as a whole, does the agency give a:
[] GREAT DEAL OF EMPHASIS to this New Technology Reporting system,
[] SOME EMPHASIS, or
[] LITTLE or NO EMPHASIS to it?

53. Why do you think that?

54. What about your particular work unit within (...FIELD CENTER NAME...)? Is a:
    [] GREAT DEAL OF EMPHASIS given to this New Technology Reporting system,
    [] SOME EMPHASIS, or
    [] LITTLE or NO EMPHASIS?

55. Why do you say that?

56. Does NASA exert: [] TOO MUCH PRESSURE,
    [] TOO LITTLE PRESSURE, or
    [] JUST ABOUT THE RIGHT AMOUNT OF PRESSURE
    in its effort to promote the New Technology Reporting system?

[PRESENT CARD 4]

57. This is a list of awards associated with the New Technology Reporting system. With which ones of these, if any, are you familiar?

Q57		Q58
[]	NASA TECH BRIEFS AWARDS	[]
[]	NASA SCIENTIFIC/TECHNICAL CONTRIBUTION AWARDS	[]
[]	NASA PATENT AWARDS	[]
[]	COMPANY SPONSORED AWARDS	[]
[]	Are there OTHERS?	[]

58. Do you personally know any winners of the (...FOR EACH AWARD CHECKED IN Q57...)?

59. Are there any aspects of the (...FOR EACH AWARD CHECKED IN Q57...) that could prevent it from being effective as a motivator?

    NASA TECH BRIEFS AWARDS:

    NASA SCIENTIFIC/TECHNICAL CONTRIBUTIONS AWARDS:

    NASA PATENT AWARDS:

    COMPANY SPONSORED AWARDS:

    OTHERS:

[REFER BACK TO CARD 3]

60. What would most encourage you to take a more active role in the New Technology Reporting system?

61. What would prevent you from taking a very active role in the New Technology Reporting system?

62. Again thinking of NASA as a whole, how does the agency benefit from the New Technology Reporting system?

63. In NASA as a whole, how does the agency suffer if the New Technology Reporting system is not effective?

64. Using this representation of the New Technology Reporting system, what element or portion of it works best?

65. Why do you feel _____ works best?

66. What element most needs strengthening?

67. Whydo you feel _____ most needs strengthening?

68. Thinking back over all of the matters we have discussed about NASA's New Technology Reporting system, how would you evaluate it:

[] EXCELLENT [] GOOD [] FAIR [] POOR [] VERY POOR

69. Why do you say that?

70. There are some people at NASA who do not participate in the New Technology Reporting system. How might they be motivated to participate?

CARD 1

Definition of Technology Transfer

Technology transfer, as used here, means the process by which technology developed for or in conjunction with a specific use is applied to another purpose or in a different setting. A simple example is the "spinoff" of a micro-electronic device from a rocket control function to an automotive application.

CARD 2

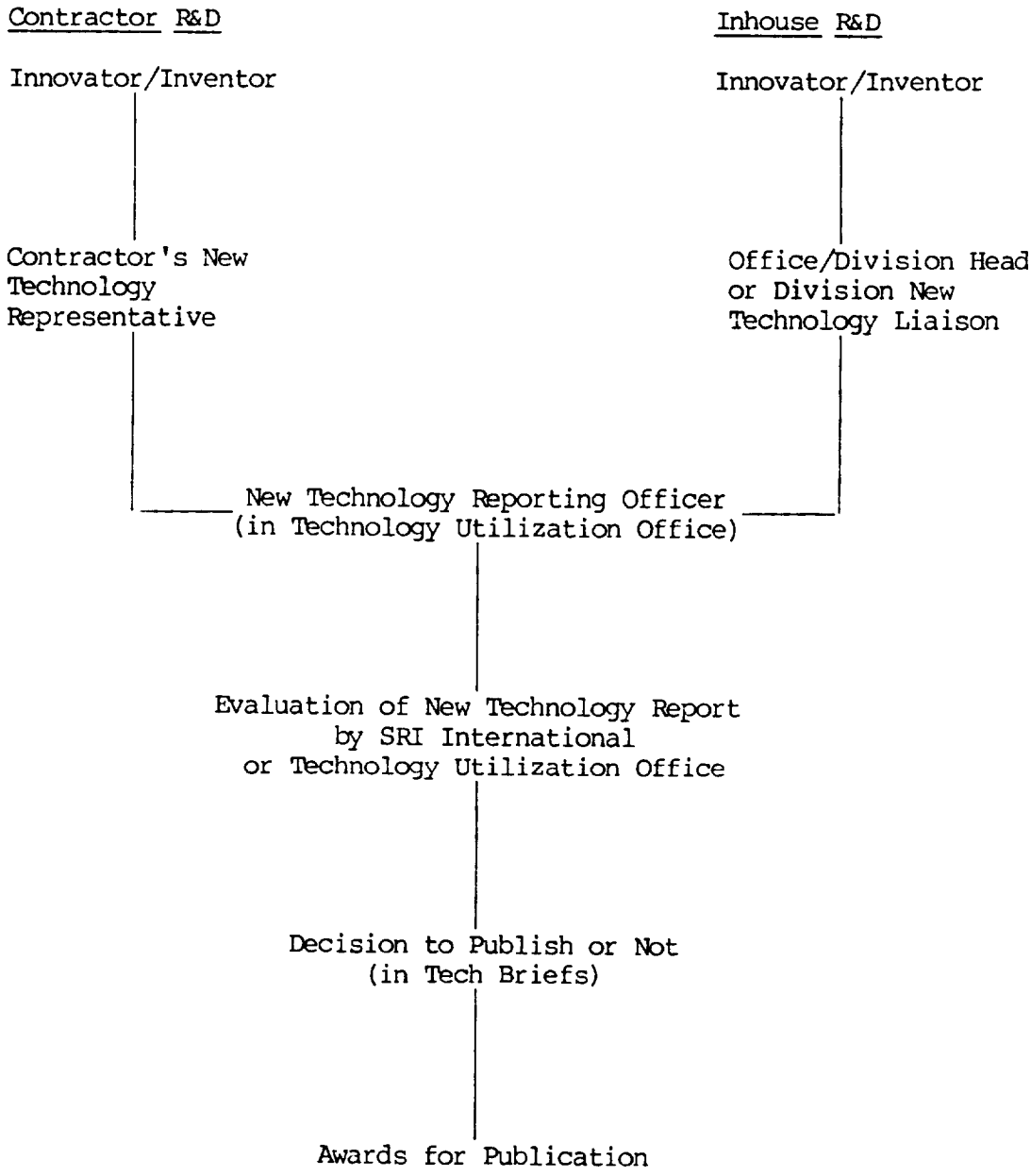
New Technology Reporting System

The objectives of NASA policy...are to obtain the prompt reporting of inventions, discoveries, improvements, and innovations made in the performance of any work...(whether or not patentable) in order to protect the Government's interest therein and to provide the widest practicable and appropriate dissemination, early utilization, expeditious benefit of the scientific, industrial, and commercial communities and the general public.

NASA Federal Acquisition Regulations, Supplemental Directive (April 1, 1984, Subpart 18-27-372 Policy)

CARD 3

New Technology Reporting System Through
Publication in Tech Briefs and Awards



CARD 4

New Technology Reporting System Awards
to Innovators/Inventors

NASA Tech Briefs Awards	$150 cash; certificate when published in Tech Briefs
NASA Recognition of Scientific or Technical Contribution of Significant Value to the Conduct of Aeronautics and Space Activities	cash award of up to $100,000 per award
NASA Sponsored Patent Awards	minimum of $150
Company Sponsored Awards	in addition to NASA sponsored awards